The Monthly Evening Sky Map

A JOURNAL FOR THE AMATEUR — FOUNDED BY THE LATE LEON BARRITT
— NORTHERN AND SOUTHERN HEMISPHERE —

ALSO A STAR, CONSTELLATION AND PLANET FINDER MAP ARRANGED FOR THE CURRENT MONTHS - JULY - AUG. - SEPT. MORNING AND EVENING - AND PRACTICALLY ANYWHERE IN THE WORLD

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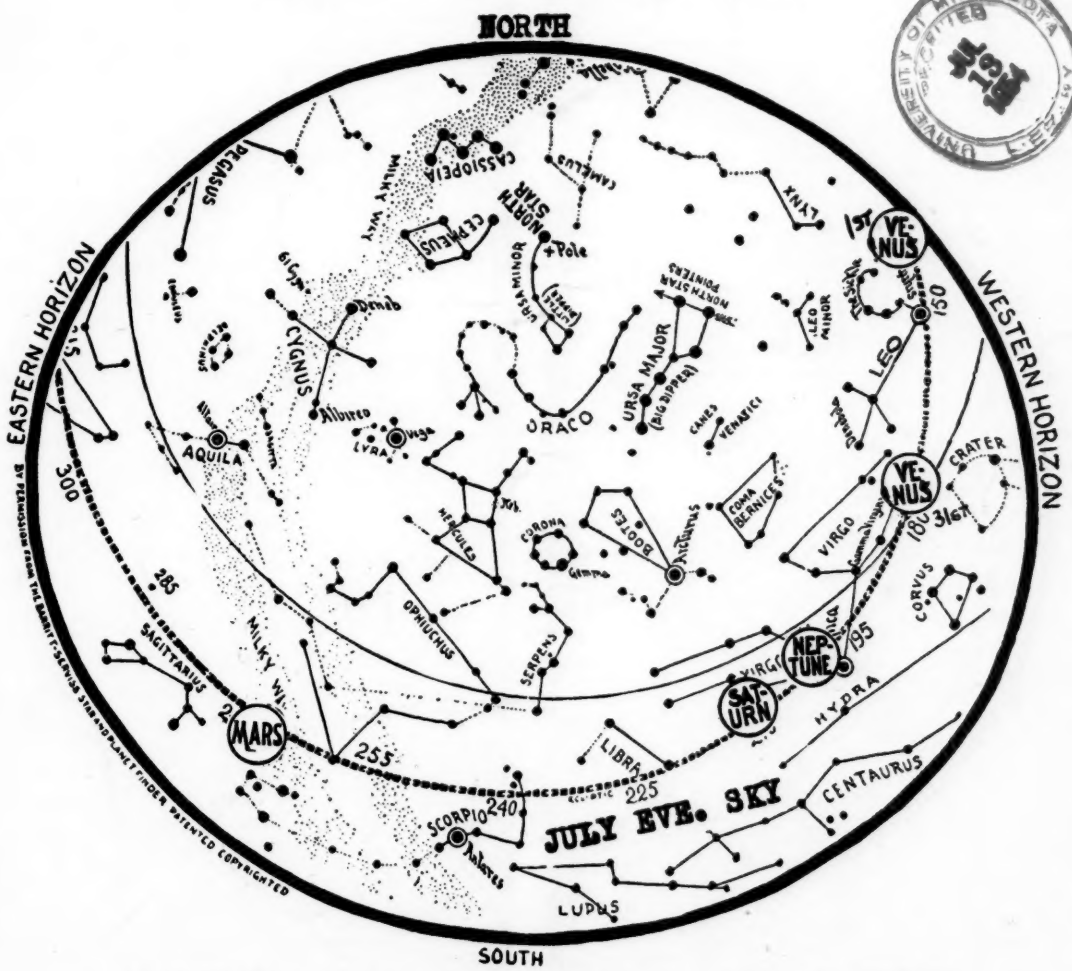
EVENING SKY MAP FOR JULY



AT 9:00 P.M., JULY 1 8:00 P.M., JULY 15 7:00 P.M., JULY 31

Face South and Hold the Map Overhead. The Top North and You Will See the Stars and Planets Just as They Appear in the Heavens. The Arrow Through the Two Stars in the Bowl of the Big Dipper Points to the North Star. The Star at the End of the Little Dipper.

This map is arranged specifically for Latitude 40 North—New York—but is practical for ten or fifteen degrees north or South of this latitude anywhere in the United States, the southern portion of Canada and the northern portion of Mexico and for corresponding latitude in Europe.

UNIVERSITY OF MINNESOTA
CATALOGED

Oklahoma's Research of Variable Stars

By Luis Freile of the University of Oklahoma

The great majority of stars shine steadily with a constant light intensity. However, the few that do change in their light intensities are known as Variable Stars. One type of these, the Eclipsing variables, is the subject of constant study at the University of Oklahoma Observatory in Norman.

The equipment used in this research consists mainly of a 10-inch reflector with a 3¼-inch camera, and associated equipment.

The research until recently, was limited to bright stars, due to the equally limited range of the reflecting telescope. However, at present, new photographic plates have made it possible for the observatory to extend its research to the fainter stars also. The specific asset of this improved, more sensitive plates was pointed out in this comment by Mr. Balfour S. Whitney, Director of the observatory and Associate Professor of Mathematics and Astronomy in the University, "The new Kodak photographic plates have doubled the size of all telescopes, and therefore amplified the field of study."

An astronomer since his pre-college days, he has dedicated most of his astronomer's career to the study of variable stars, and through outstanding accomplishments, he has acquired national and international standing. Most of the results of his work have been published in astronomical and astrophysical publications in the United States and abroad.

The study of the eclipsing variables is carried out by Photographic Photometry; the process of measuring brightness by photographic plates.

Eclipsing variable stars are, essentially, a combination of two stars: one of them goes around the other eclipsing its light. In that manner, the light of the pair combined diminishes when the one partially hides the other.

Professor Balfour S. Whitney
University of Oklahoma

As there exists some order in the movements of both celestial bodies, we have to assume that the occurring fluctuations remain in most cases within relatively defined limits. This kind of motional order, in turn, determines another type of orderliness, namely that of the time of maximum and minimum. When the light is brightest, and when it is faintest.

The importance of eclipsing variables as a subject of research is centered upon the fact that their physical nature can be expressed quantitatively with a fair degree of accuracy, through the study of the fluctuations in light intensity (brightness). Such physical nature can be explained as being a set of magnitudes, for example; the shape of the variable's orbit, eccentricity of the orbit, orbital inclination, radii of the star, density, etc. Furthermore, eclipsing variables present fewer problems of astrophysical nature than do, for example, the variables whose brightness change intrinsically.

The amount of work going into the research of one variable is voluminous in any case, but actually it depends on the Star's orbital magnitude and its period. In instances it takes years, even generations, to complete the study of one star. Short-period stars can be studied in a moderate time limit, ranging from a day to a year.

However, on long period stars, a limited study can be done to contribute partially to that finished material that other astronomers might have worked on previously.

The Theoretical sequence of study and research on variables can be generalized as follows:

a.) Discovery of the Variable.—
Taken up only when discovery is intended. A number have been discovered by Professor Whitney. "Actually the discovery is comparatively a simple thing to do. Just focus the telescope and camera on a thinly or unexplored celestial field," Mr. Whitney says.

b.) Name the new variable.—According to the standard procedure: Argelander's denominational System.

c.) Observation of the variable.—At intervals of a maximum length.

d.) Determination of the Astrophysical characteristics. A descriptive explanation.

e.) Quantitative Study.—To determine the period.

f.) Calculation of the Maximum and Minimum.

g.) Construction of a light curve.

The principles of the theoretical sequence of study show themselves in a more elaborate picture, when applied to the actual study of specific types of variables. It is here when changes have to be made in the theoretical seqeunce to accommodate the research to the conditions imposed by the astrophysical nature of the star, as they are encountered.

For our purposes, in relation to Professor Whitney's Research, let us propose the general case of a short-period eclipsing variable. The study is carried on the following basis:

1.) Photographic Exposures. — Numerous plates are taken. The number of plates per night depends on the rate of change in brightness. The exposures are timed so that the negative may be measured; not long enough, however, to overexpose the plate which causes unmeasur-

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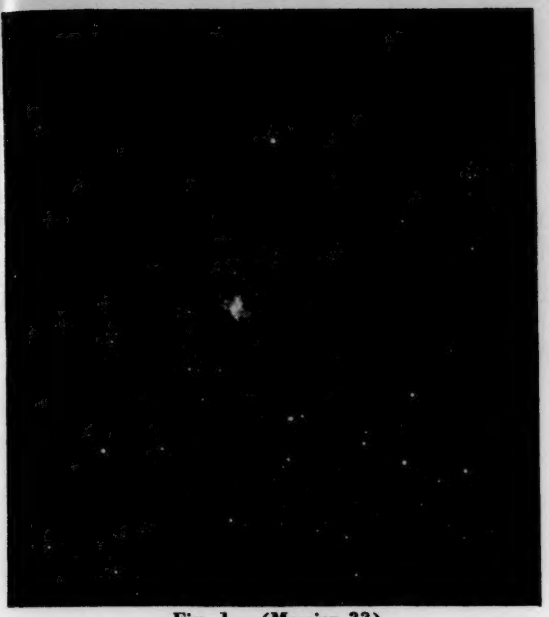

Fig. 1.—(Messier 33)
Courtesy of the Observatory, University of Oklahoma

able blurs. For example, the plate on Messier 33 was taken at the University observatory on December 31, 1953. It was a 40-minute exposure using Kodak's new more sensitive plate.

2.) Measuring the plates for brightness. – The negatives of the plates are observed. Brightness comparisons are established between the variable under study and two other stars on the same plate known as "comparison stars," one comparison star being brighter than the variable, and the second fainter.

The difference between the brightness is expressed in the form A3V3B, for example. In order to determine the variables' brightness quantitatively, interpolations between the comparison stars have to be made using Pogson's Step method, by which the variable is estimated by further comparisons termed steps (so many steps brighter, or so many fainter.) Each step is 1/10 of a magnitude. The magnitude of the comparison stars is previously known or calculated.

3.) Reduction of Measures.—The Mathematical reduction is performed so as to determine the magnitude of the variable. The Stellar Magnitude Scale is based on Pogson's ratio of brightness, whereby the ratio of brightness between two successive magnitudes shall be $\sqrt[5]{100} = 2.512$ (expressed logarithmically or exponentially). The relative intensity between two magnitudes (t and s) can be calculated by the formula

$$\frac{Is}{It} = 2.512^{(t-s)}$$

4.) Plot a light curve.—Light Curve and brightness curves are the same concept. The graph is plotted from data established in step (c.). A basic notion has to be understood: a straight line represents a non-variable star characterized by constant light intensity; any shape of curved line will automatically define a star as a variable.

The graph is constructed on Cartesian Coordinates whereby the abscissa plots the time, and the ordinate plots the magnitude or brightness. In interpreting the resultant curve, three concepts must be held in mind:

a.) For increasing brightness, the line slopes up toward the right;

b.) For decreasing brightness, the line slopes down toward the right;

c.) Steepness in the curve line is an indicator of the rate at which light changes.

Figure two represents the light curve of QY Aquilae. The normal points are means of 10 observations.

To plot this curve, 1,390 photographic exposures were made.

The importance of plotting a curve is mostly emphasized by the fact that it is more advantageous in the determination of the minima.

A minimum is, essentially, the time when the star is faintest; a value determined on basis of the light curve. The interval between two successive minima determines a period, which in turn is part of a chain of periods forming the cycle.

5.) Comparison of Minima.—For each minimum there are actually two values established: the observed time of the minimum and the computed time of the minimum. The first is obtained from the photographic plates; the latter is computed through a mathematical formula using values based on the best light elements available. The actual comparison of these two values known as the "O-C value" consists of subtracting the computed value

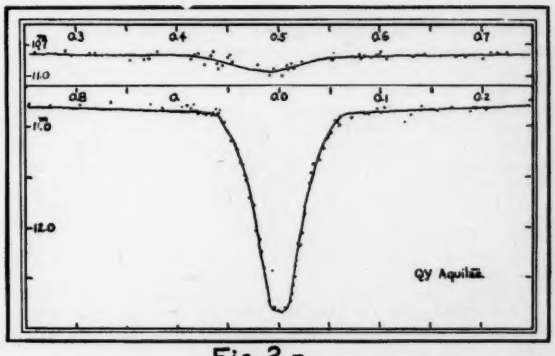

Fig. 2.-

Continued on Page five

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MRS. LEON BARRITT, Editor
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Irving L. Meyer
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Box 3, Pike County, Shohola, Pa.
Telephone Milford 2310

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AMATEUR'S FORUM

By IRVING L. MEYER, M.S.

JULY 1954

THE SUN: moves from Gemini into Cancer. It is farthest from the earth the 3rd at 94.4 million miles distance.

THE MOON: is at apogee (farthest from the earth) on the 9th at 251,000 miles distance, and is at perigee (closest to the earth) on the 23rd at 230,000 miles.

The Moon's phases (E. S. T.):

First quarter	July 7 at 8:33 PM
Full Moon	15 at 7:29 AM
Last quarter	22 at 7:14 PM
New Moon	29 at 5:20 PM

There will be a partial eclipse of the Moon on the 15th, the ending of which will be visible in the eastern part of the United States. The eclipse will be seen best from Europe and Africa.

Circumstances of the Eclipse (E. S. T.)

Moon enters penumbra	July 15 at 4:48 PM
Moon enters umbra	15 at 6:09 PM
Middle of eclipse	15 at 7:20 PM
Moon leaves umbra	15 at 8:31 PM
Moon leaves penumbra	15 at 9:53 PM

At its maximum, 41% of the Moon's diameter will be obscured.

MERCURY: is in the evening sky until conjunction with the Sun on the 6th, and thereafter appears as a morning sky object. It travels so swiftly that by the 26th it reaches greatest elongation west of the Sun, 19° 49′, and can be seen in the morning twilight low in the east. At this time it is about as bright as a first magnitude star, and in the telescope will appear as a crescent. It remains in Gemini all month, and is closest to the earth on the 3rd at 52.3 million miles distance.

VENUS: moves from the western edge of Leo through the entire constellation, into Virgo. It is in the evening sky all month, well placed for observation. Venus is the brightest star-like object in the heavens, averaging magnitude —3.6 during the month. In the telescope it still appears gibbous (like the 8 or 9 day Moon), and of an apparent diameter of about 15″. Distance the 1st is 111 million miles, and the 31st is 90 million miles.

MARS: retrogrades in the Sagittarius-Scorpio area, well placed for observation in the evening sky. It is just past opposition, but reaches its closest point to the earth the 2nd at 39,700,000 miles, resulting in an apparent diameter of 21.9″. It is one of the most fascinating telescopic objects in the heavens, for with moderate magnification (100 diameters and up) the polar caps and seas are readily discernible. At this time both polar caps should be visible, as Mars' pole is only slightly inclined as seen from earth. Magnitude the beginning of the month is —2.2, making this the second brightest stellar object in the skies.

JUPITER: in Gemini, in the morning sky, is too close to the Sun all month to be visible. Distance from the earth reaches a maximum the 2nd at 574 million miles.

SATURN: in Virgo in the evening sky, is still well placed for observation, setting around midnight. Its ring systems and brighter satellites make wonderful telescopic fare, requiring a power of only about 50 diameter. On the 15th it is 891 million miles from the earth, and is of magnitude 0.8.

URANUS: also in Gemini, is in conjunction with the Sun on the 16th, thereupon entering the morning sky. It is too close to the Sun all month to be observable. Distance the 15th (maximum) is 1829 million miles.

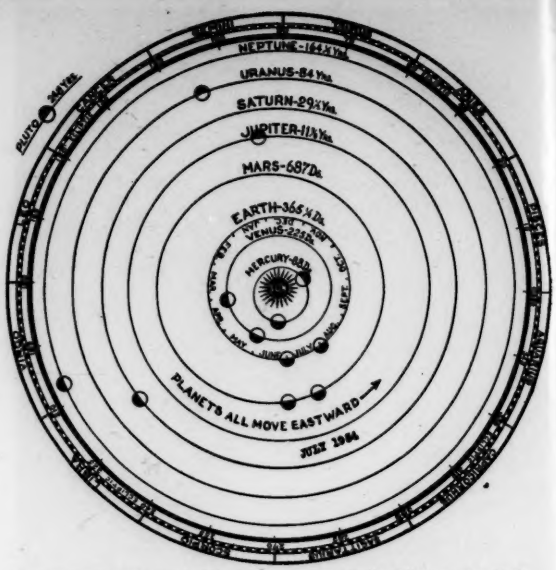
NEPTUNE: is an 8th magnitude object in Virgo in the evening sky. It sets around midnight, but cannot be seen with optical aid. Medium to high power on the telescope will reveal its tiny, dull disc. Distance the 15th is 2812 million miles.

PLANETARY CONFIGURATIONS

Eastern Standard Time

JULY 1954

July	1—	8:23 AM	Conjunction, Uranus and Moon; Uranus north 1° 13′
	2—	3: AM	Mars nearest Earth
	3—	9:53 AM	Conjunction, Venus and Moon; Venus north 5° 6′
	3—	3: PM	Earth in aphelion
	5—	6: PM	Neptune stationary in Right Ascension
	6—12:	AM	Inferior conjunction, Mercury and Sun; Mercury south 4° 38′
	7—10:	AM	Saturn stationary in Right Ascension
	8—	6:02 PM	Conjunction, Neptune and Moon; Neptune north 7° 25′
	9—12:51	PM	Conjunction, Saturn and Moon; Saturn north 7° 54′
	10—12:	PM	Conjunction, Mercury and Jupiter; Mercury south 4° 52′
	13—	7:18 PM	Conjunction, Mars and Moon; Mars south 3° 20′
	15		Partial eclipse of the Moon
	16—	5: AM	Quadrature, Neptune and Sun
	16—	6: AM	Conjunction, Uranus and Sun
	16—	4: PM	Mercury greatest heliocentric latitude south
	16—11:	PM	Mercury stationary in Right Ascension
	19—	9: PM	Jupiter in ascending node
	26—	7: AM	Quadrature, Saturn and Sun
	26—10:	PM	Mercury greatest elongation west, 19° 49′
	27—	7: PM	Conjunction, Mercury and Jupiter; Mercury south 1° 55′
	28—	2:57 AM	Conjunction, Jupiter and Moon; Jupiter 0° 0′
	28—	3:26 AM	Conjunction, Mercury and Moon; Mercury south 1° 48′
	28—	8:10 PM	Conjunction, Uranus and Moon; Uranus north 1° 22′
	29—10:	AM	Mars stationary in Right Ascension



Orbits and Heliocentric Movements of the Planets for July

NOTE: The planets are shown in their respective orbits. Two positions, one for the first, and one for the last day of the month, are given for Mercury, Venus and Mars. The arrow indicates the last day of the month, Jupiter, Saturn, Uranus and Neptune are shown in the mean position for the current month.

AMATEUR'S FORUM

By IRVING L. MEYER, M.S.

AUGUST 1954

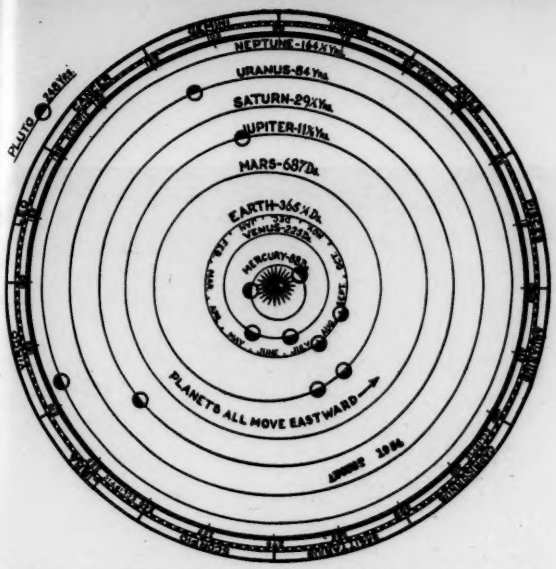
THE SUN: is still high in the northern sky, but moving at an ever more rapid pace toward the equator. It moves from Cancer into Leo. Distance the 1st is 94.3 million miles, and the 31st is 93.8 million miles.

THE MOON: is farthest from the earth the 5th at 251,000 miles, and is closest the 18th at 228,000 miles.

The Moon's phases (E. S. T.):

First quarter	August 6 at 1:50 PM
Full Moon	14 at 6:03 AM
Last quarter	20 at 11:51 PM
New Moon	28 at 5:21 AM

MERCURY: is in the morning sky until superior conjunctions with the Sun on the 21st, after which it is in the evening sky. It is too close to the Sun all month to be observable. It moves from Gemini through Cancer and Leo, into Virgo. Maximum distance from the earth is 127, reached on the 28th.



Orbits and Heliocentric Movements of the Planets for August

VENUS: travels in Virgo all month, and on the 31st is very close (north) to Spica. It is in the evening sky, very well situated for observation. On the 1st, distance is 89 million miles, diameter is 17″, magnitude —3.6, and illumination of the disc is 65% (gibbous); on the 31st, distance is 68 million miles, diameter 23″, magnitude —3.9, and illumination 52%.

MARS: is a brilliant evening sky object on the Scorpio-Sagittarius boundary. Its motion is so rapid that during the month distance increases from 45 to 57 million miles, with consequent decreases in brightness from magnitude —1.7 to —1.0, and apparent diameter from 19″ to 15″.

JUPITER: in the morning sky in Gemini, is still too close to the Sun for worthwhile observation. Distance the 15th is 557 million miles.

SATURN: in Virgo, is in the evening sky. It is still readily observable, though it sets before midnight. To the naked eye it appears as a bright star. Distance the 15th is 938 million miles.

URANUS: is in the morning sky on the Gemini-Cancer boundary, too close to the Sun to be observable. Distance the middle of the month is 1817 million miles.

NEPTUNE: is in Virgo, a few degrees north of Spica. It is still observable in the evening sky, but now sets well before midnight. This planet is invisible to the naked eye. Distance the 15th is 2859 million miles.

PLANETARY CONFIGURATIONS

Eastern Standard Time

AUGUST 1954

Aug.	2—	1:18 PM	Conjunction, Venus and Moon; Venus north 5° 52′
	4—	7: AM	Conjunction, Mercury and Uranus; Mercury south 0° 35′
	4—	5: PM	Mercury in ascending node
	5—	2:27 AM	Conjunction, Neptune and Moon; Neptune north 7° 19′
	5—	10:08 PM	Conjunction, Saturn and Moon; Saturn north 7° 40′
	8—	7: PM	Venus in descending node
	9—	8: AM	Mercury in perihelion
	10—	2:32 AM	Conjunction, Mars and Moon; Mars south 3° 6′
	17—	9: PM	Conjunction, Pluto and Sun
	19—	2: PM	Mercury greatest heliocentric latitude north
	21—	3: PM	Superior conjunction, Mercury and Sun; Mercury north 1° 46′
	24—	8:08 PM	Conjunction, Jupiter and Moon; Jupiter north 0° 39′
	25—	6:05 AM	Conjunction, Uranus and Moon; Uranus north 1° 35′
	29—	1:01 AM	Conjunction, Mercury and Moon; Mercury north 6° 25′

Oklahoma's Research of Variable Stars

Continued from Page three

from the observed to obtain a third quantity known as residual.

Observed minus Computed = Residual
O — C = Residual

The residual is a quantitative value which compared to other residuals help determine the constancy of variability of a period.

6.) Repeat the process.—The sequence followed throughout (1) to (5) is repeated to establish another minimum in order to compare it with the one obtained in the first round, and calculate the variability of a period through the differences. This is a positive contribution toward the understanding of the star's behavior, physical characteristics and the calculation of orbital magnitudes, inclination, radii of the star density, visualization of the cycle which is the ultimate goal.

7.) Publish Results of Research.—This is an optative interest mainly taken up by professional astronomers. Amateurs are encouraged to publish their results, their contributions are of value to other research projects.

Professor Whitney is the only astronomer in Oklahoma engaged in the research of variable stars. He started to work at the University's Observatory in 1940, and throughout his work, he has been responsible for the discovery of several new variables. More than 12,000 photographic plates have been taken during this time, with an output of twenty (20) published papers.

Mr. Whitney is considering the possibility of expanding his field for research by establishing a new observatory equipped with an 18- or a 24-inch reflector in place of the 10-inch he now uses. Research material is unlimited, whereas the acquired knowledge of variable stars is yet infinitesimal.

AUGUST METEORS AND THE EQUINOCTIALS

This is the month of the famous "Tears of St. Lawrence," or the "August meteors," which radiate every year from the 10th to the 12th of August from the constellation Perseus, which does not rise into a good position for observation until after 10 o'clock. It may then be seen far round in the northwest. Those meteors are swift in their movement, often leaving momentary bright streaks, and sometimes they present various colors. Occasionally they are very brilliant. They are known to be travelling in the same orbit as that of a comet, known as Tuttle's, which appeared in 1862, and they are probably fragments of the original cometary mass or aggregation. They seem to be distributed more or less uniformly all round the orbit, which is an enormous ellipse having the sun in one of its foci, while the other is extended far out in space beyond the orbit of Neptune.

There are several other meteor "showers" in August, but none so conspicuous as that just named.

It is an interesting circumstance that this month, at the hour for which the chart is drawn, the Equinoctial Points, or the places where the equator and the ecliptic cross one another are simultaneously visible, the Vernal Equinox, or the "Greenwich of the Sky," where the sun crosses the equator when coming up out of the Southern Hemisphere in the spring, being on the horizon in the east, while the Autumnal Equinox, the point where the sun crosses the equator when sinking southward in the autumn, is on the horizon in the west. The Vernal Equinox is in the constellation Pisces and the Autumnal Equinox in the constellation Virgo.

XUM

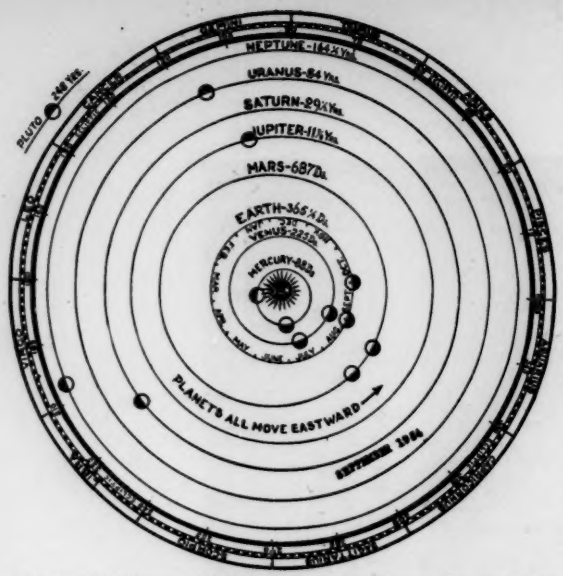
MOST STRIKING PHOTOGRAPH EVER TAKEN OF THE MOON

Made with the 100-inch Hooker Telescope at Mount Wilson, California, by Professor Francis G. Pease

SHOWING THE REGION OF CLAVIUS, MAGINUS, LONGOMONTANUS, AND TYCHO

Clavius is the large crater, 142 miles broad, midway of the upper half of the picture. Its highest western peak stands 17,000 feet above the floor, and the deepest of the four small craters within is 6,000 feet deep. Maginus, whose wall rises 14,000 feet, is just below and a little to the left. Longomontanus, with walls of 15,000 feet in height, is below to the right, and Tycho, 54 miles in diameter, is the small but conspicuous crater, just above the center of the picture, having a little crater peak in the center of its base. The walls of Tycho rise to 17,000 feet. If Mt. Blanc could stand on its floor it would not be possible from its summit to see over them.

The top of the picture is South and the right hand East.



Orbits and Heliocentric Movements of the Planets for September

AMATEUR'S FORUM

By IRVING L. MEYER, M.S.

SEPTEMBER 1954

THE SUN: crosses the equator, moving south-eastwardly from Leo into Virgo. Distance the 1st is 93.8 million miles against 93.0 million miles the 30th.

THE MOON: is farthest from the earth twice: on the 2nd and the 30th, both times at 252,000 miles. It is closest the 14th at 225,000 miles.

The Moon's phases (E. S. T.):

First quarter	September 5 at 7:28 AM
Full Moon	12 at 3:19 PM
Last quarter	19 at 6:11 AM
New Moon	26 at 7:50 PM

MERCURY: remains in Virgo the entire month, as an evening sky object. It is too close to the Sun for satisfactory observation. Distance the 1st is 127 million miles, decreasing to 102 million miles the 30th.

VENUS: is at greatest elongation east of the Sun, 46° 14′, on the 6th, in the evening sky. Brilliant, and at its best for observation, it is approaching the earth rapidly. During the month telescope-users will note that Venus changes in appearance from slightly gibbous (52% illuminated) to a crescent (32% illuminated). Distance decreases from 67 to 46 million miles, causing diameter to increase from 23″ to 34″, and magnitude from —3.9 to —4.2. This planet is so overpoweringly bright that it is best observed in the telescope in broad daylight.

MARS: in Sagittarius in the evening sky, is now receding from the earth at a rapid pace. It still sets well after midnight, and still is a rewarding sight when observed in a sizeable telescope. The polar caps, and more prominent markings (such as the Syrtis Major) are readily detected. Distance is 58 million miles at the beginning of the month against 73 million miles the end.

JUPITER: can now be observed in the late morning sky before dawn, on the Cancer-Gemini boundary. It is very bright (magnitude —1.6) and so large that even binoculars will reveal its flattened disc. Distance the 15th is 526 million miles.

SATURN: is rapidly leaving the evening scene. It sets only a few hours after the Sun, so its period of observability is sharply curtailed. Distance the 15th is 978 million miles.

URANUS: close to Jupiter on the Cancer-Gemini boundary, can also be observed in the pre-dawn morning sky. However, at best this planet can just barely be seen with the naked eye, as it is of the 6th magnitude. Distance the 15th is 1785 million miles.

NEPTUNE: is also departing rapidly from the evening scene. It is an 8th magnitude object in Virgo, not visible to the naked eye. Distance the 15th is 2894 million miles.

PLANETARY CONFIGURATIONS

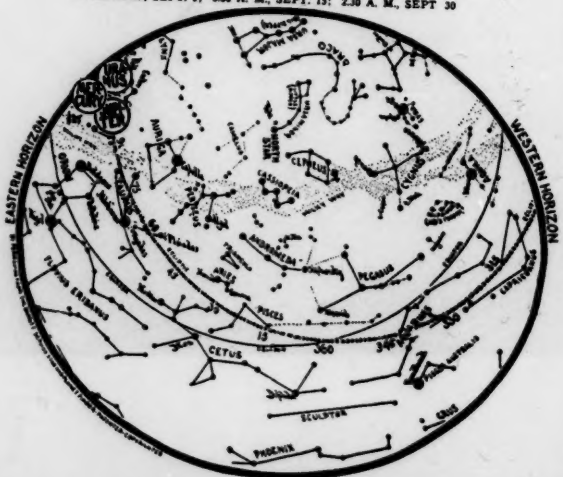
Eastern Standard Time

SEPTEMBER 1954

Sept.	1— 9:31 AM	Conjunction, Venus and Moon; Venus north 3° 5′
	1—11:18 AM	Conjunction, Neptune and Moon; Neptune north 7° 6′
	2— 9: AM	Conjunction, Venus and Neptune; Venus south 4° 9′
	2— 9:16 AM	Conjunction, Saturn and Moon; Saturn north 7° 18′
	6— 1: AM	Venus greatest elongation east, 46° 14′
	7— 4:41 AM	Conjunction, Mars and Moon; Mars south 3° 15′
	9— 2: AM	Mars greatest heliocentric latitude south
	12— 1: AM	Mercury in descending node
	12— 9: AM	Venus in aphelion
	15—10: PM	Conjunction, Venus and Saturn; Venus south 6° 8′
	21—10:45 AM	Conjunction, Jupiter and Moon; Jupiter north 1° 20′
	21— 2:03 PM	Conjunction, Uranus and Moon; Uranus north 1° 53′
	22— 8: AM	Mercury in aphelion
	23— 8:56 AM	Sun enters Libra; Equinox
	26—12: AM	Conjunction, Mercury and Neptune; Mercury south 3° 42′
	28— 7:58 PM	Conjunction, Neptune and Moon; Neptune north 6° 55′
	29— 3:12 AM	Conjunction, Mercury and Moon; Mercury north 2° 42′
	29— 9:19 PM	Conjunction, Saturn and Moon; Saturn north 6° 54′
	30— 5:14 PM	Conjunction, Venus and Moon; Venus south 1° 13′

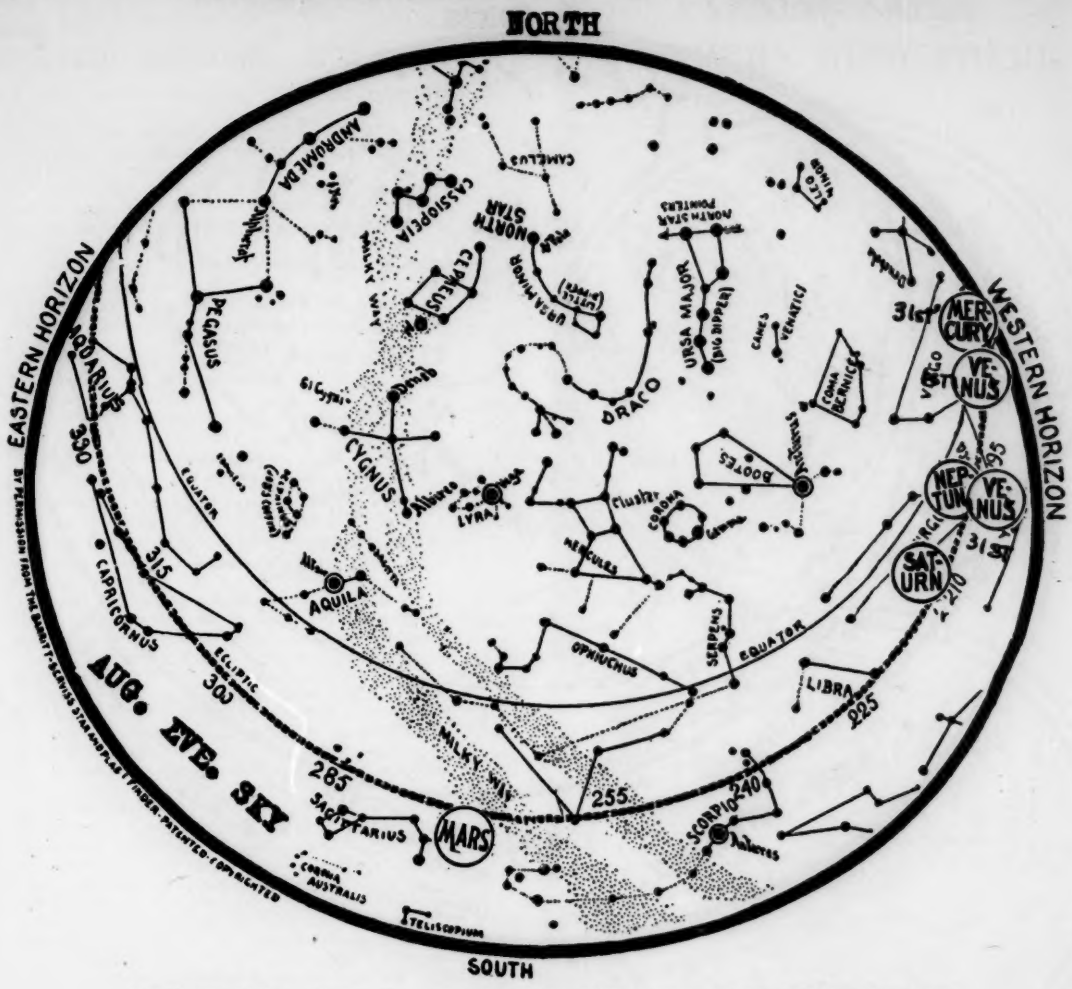
MORNING SKY MAP FOR SEPTEMBER

AT 4.30 A. M., SEPT. 1; 3.30 A. M., SEPT. 15; 2.30 A. M., SEPT 30



AT 4 A. M., AUG. 1; 3 A. M., AUG. 15; 2 A. M., AUG. 31

EVENING SKY MAP FOR AUGUST



AT 9:00 P.M., AUG. 1 8:00 P.M., AUG. 15 7:00 P.M., AUG. 31

This map is arranged specifically for Latitude 40 North—New York—but is practical for ten or fifteen degrees north or South of this latitude anywhere in the United States, the southern portion of Canada and the northern portion of Mexico and for corresponding latitude in Europe.

SEPTEMBER EVENING SKIES

The Stars and Constellations

One of the glories of the September sky is the vast arch of the *Milky Way*, spanning the heavens from the northeast to southwest. Some of its richest portions are seen high overhead in the constellation *Cygnus*, marked by the striking figure of the "Northern Cross." The *Milky Way* is also very bright where it dips toward the southern horizon between *Scorpio* and *Sagittarius*. In the northern part of the sky it appears most brilliant in *Cassiopeia* and *Perseus*. There is no greater pleasure for the possessor of a small telescope than to follow the course of the *Milky Way* throughout its whole visible extent, using the lowest magnifying powers with which the glass is equipped. A power of 25 diameters on a three-inch telescope will reveal clouds upon clouds of glittering stars so small and so innumerable that they resemble diamond dust strewn upon a black background. Here and there the *Milky Way* gathers in knots and spirals which are wonderful to look upon.

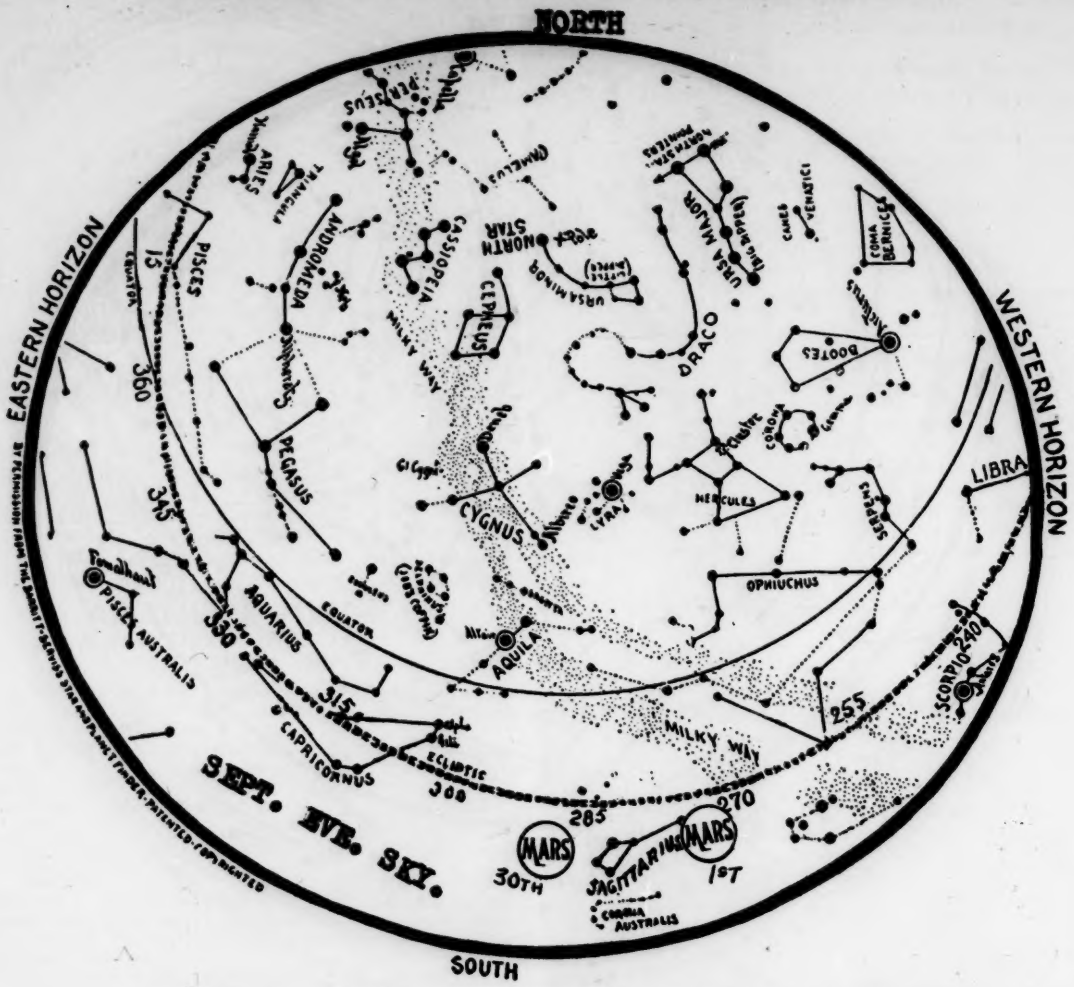
The *Milky Way* may serve us on this occasion as a sort of highway dividing the visible constellations into two great fields. Five stars usually ranked as the first magnitude are visible, namely, *Arcturus*, in *Bootes*, now low in the west; *Vega*, in *Lyra*, high overhead; *Altair*, in *Aquila; Formalhaut*, in *Picses Australis* and *Capella*, in *Auriga*, which is just rising far round in the northeast. Of these five, three are in reality much brighter than a standard first magnitude star; they are *Capella*, *Vega* and *Arcturus*. Every one of them is not only a very bright object in the sky, but also a much larger sun than ours, exceeding it, perhaps, not less than a thousand times in light-giving power. Each may be the center of a vast system of planets. But *Capella* is double, composed of two enormous suns close together, a fact which introduces many complications from the point of view of an attendant planetary system.

The readers will observe that the *"Great Dipper"* in *Ursa Major*, has now descended below the pole in the northwest while *Cassiopeia*, opposite to it, has attained a comparatively great elevation in the northwest. It is always interesting to watch the "balancing" of these two constellations, which seem to play at see-saw, with the *Pole Star* for their pivot.

Andromeda is now becoming conspicuous in the west and northwest. The reader will observe that the star *Alpheratz*, at the northeast corner of the Great Square of *Pegasus*, is common to the two constellations *Pegasus* and *Andromeda*. In reality, however, it should be assigned to *Andromeda* alone, and it is counted for *Pegasus* simply because it serves to complete the figure of the "Square." *Alpheratz* is represented in the old constellation figures, such as those drawn by the celebrated German artist, Albrecht Durer, for Flamsteed's "Celestial Atlas," as shining in the forehead of *Andromeda*. It is a star of the second magnitude. Two other stars of the same magnitude form a line with it, stretching downward toward the horizon, the first of these in *Andromeda's* girdle and the second in her foot.

Between *Andromeda* and the Pole is *Cassiopeia*, and below her feet in the northeast appears *Perseus*. The story of these constellations is one of the most interesting instances of the connection between ancient mythology and the imaginary figures in the starry heavens. *Andromeda* represents the beautiful daughter of *Cassiopeia*, queen of Ethiopia, who was chained to a rock by the seaside to be devoured by a sea monster as a punishment for her mother *Cassiopeia*, who had boasted herself as fairer than the sea nymphs. According to the fable she was rescued by the hero *Perseus* who froze the sea monster into stone

EVENING SKY MAP FOR SEPTEMBER



AT 9:00 P.M., SEPT. 1 8:00 P.M., SEPT. 15 7:00 P.M., SEPT. 30

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September Evening Skies

Continued from Page nine

by presenting before its eyes the head of the snake tressed *Gorgon*, which he had cut off. A curious fact in connection with this legend is that attached, as it were, to the constellation *Perseus* is a small group of stars comprising one of the most wonderful objects in the heavens. *Algol*, this star, whose position is clearly indicated on the chart, varies, in a period less than three days, to such a degree that it is at certain periods several times brighter than at others. The changes take place in regular order, giving to the star the look, as has been somewhat fancifully said, of "a slowly winking eye." The word "Algol" in Arabic means "The Demon" and it is at least a curious coincidence that so strange an object should be attached to the constellation *Perseus*, when we recall the story of that constellation, as just given.

The Sun enters the Zodiacal sign Libra, and the astronomical Autumn begins at 10:45 o'clock on the morning of the 23rd. This is called the Autumnal equinox, and the position of the Sun at this epoch is indicated on the chart by the crossing of the lines of the equator and the ecliptic at the figures 180. The ecliptic being the apparent path of the Sun through the heavens, the reader will notice that after passing the Autumnal equinox his course will lie constantly below or south of the equator, until he returns into the northern hemisphere after six months at the crossing point on the opposite side of the chart known as the vernal equinox. When the Sun is at either of the two equinoxes day and night are of equal length all over the world. As he descends south of the equator the night begins to exceed the day in length in the northern hemisphere.

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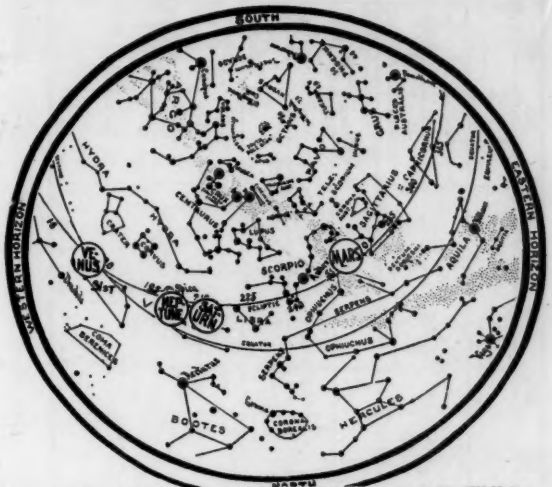
EVENING SKIES
SOUTHERN HEMISPHERE



AT 9:30 P. M., JULY 1; 8:30 P. M., JULY 15; 7:30 P. M., JULY 31

AT 9:00 P. M. AUG 1; 8.00 P. M. AUG. 15; 7:00 P. M. AUG. 31.

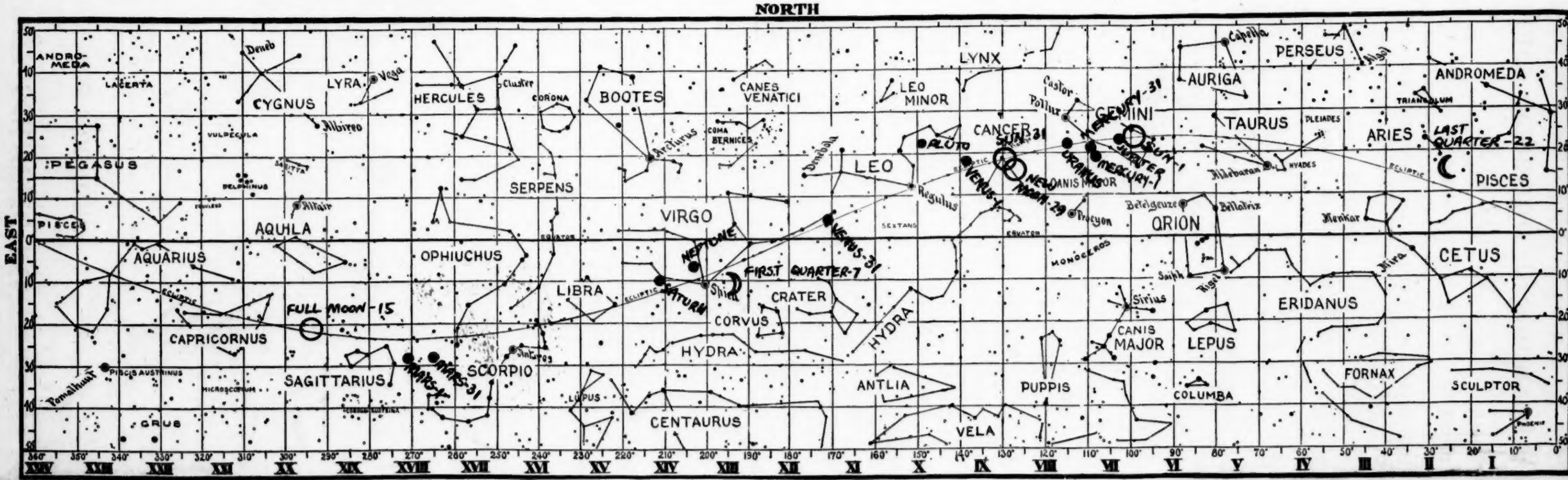
AT 9.00 P M. SEPT. 1; 8.00 P M. SEPT. 15; 7:00 P M SEPT 30

A MERCATOR PROJECTION OF THE STAR FIELD FOR 50 DEGREES NORTH AND 65 SOUTH OF THE EQUATOR

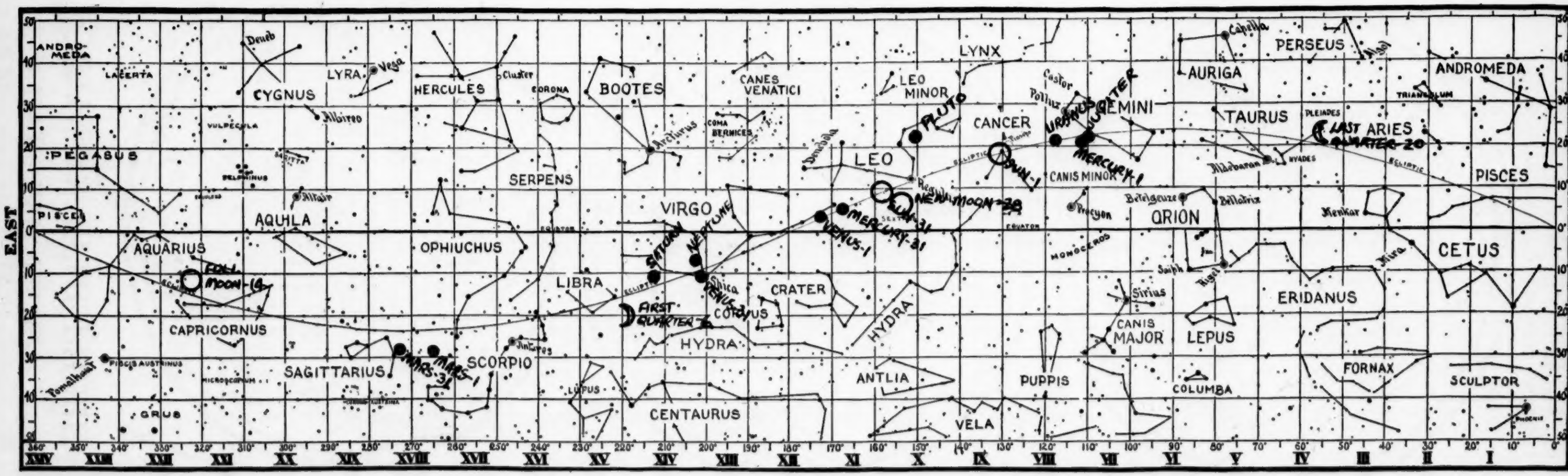
The Star Field makes an apparent complete revolution westward every 24 hours, hence the hourly division from I to XXIV, but this has no relation to the time that any portion of the map is in view. Practical as a Star, Constellation and Planet Finder for the current months—July-August, 1954—Anywhere in the world.
Showing also the position of the Sun at the beginning and ending of the month and the position of the Moon at its several phases.

NORTH

EAST — WEST — JULY 1954



EAST — WEST — AUGUST 1954



Nov. 5 Oct. 22 Oct. 5 Sept. 20 Sept. 5 Aug. 20 Aug. 5 July 20 July 5 June 20 June 5 May 20 May 5 Apr. 20 Apr. 5 Mar. 20 Mar. 5 Feb. 18 Feb. 2 Jan. 20 Jan. 5 Dec. 20 Dec. 5 Nov. 20

THE DATE BELOW EACH NUMERAL WILL SHOW WHEN THAT SECTION OF THE MAP WILL BE ON THE MERIDIAN—DUE SOUTH—AT 9 P.M. OR AN HOUR EARLIER FOR EACH NUMERAL WEST OF THIS DATE AND AN HOUR LATER FOR EACH NUMERAL EAST.

The Monthly Evening Sky Map

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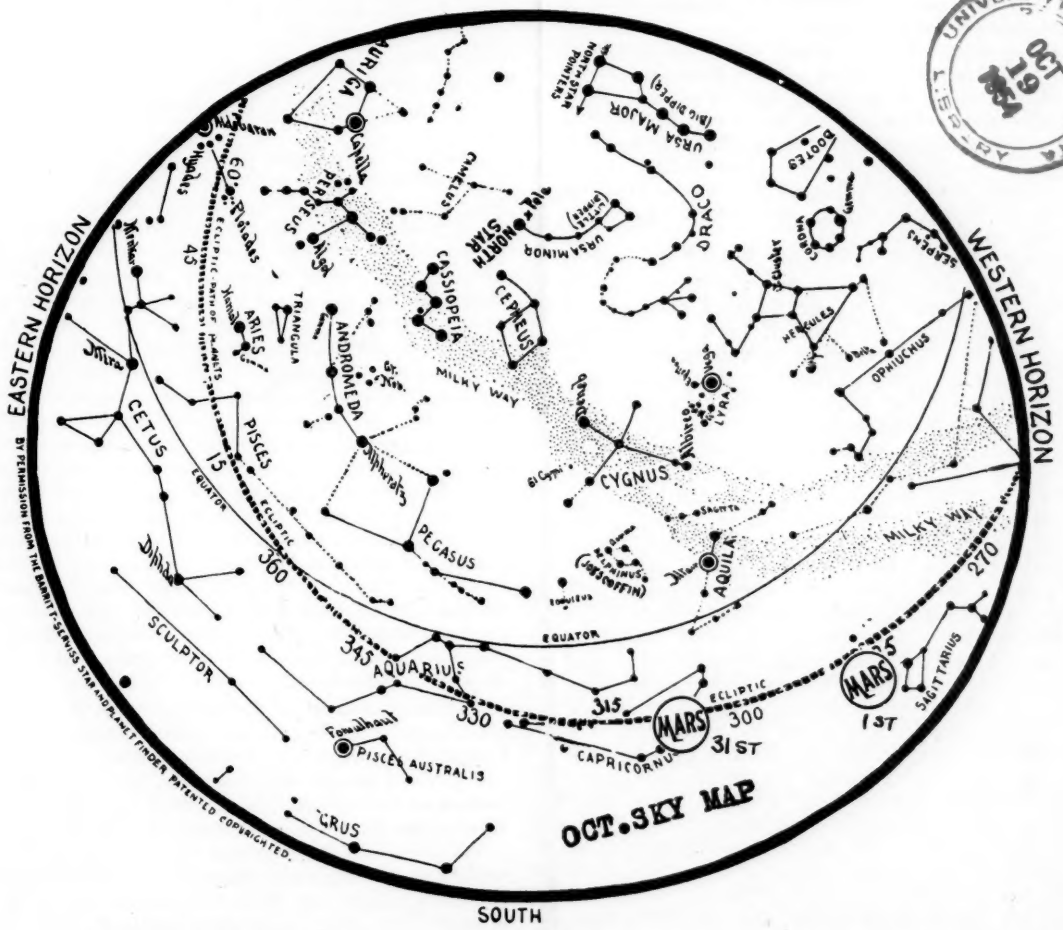
UNIVERSITY OF MINNESOTA AGRICULTURE OCT 19

EVENING SKY MAP FOR OCTOBER



AT 9:00 P.M., OCT. 1 8:00 P.M., OCT. 15 7:00 P.M., OCT. 31

Face South and Hold the Map Overhead. The Top North and You Will See the Stars and Planets Just as They Appear in the Heavens. The Arrow Through the Two Stars in the Bowl of the Big Dipper Points to the North Star. The Star at the End of the Little Dipper.

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A MERCATOR PROJECTION OF THE STAR FIELD FOR 50 DEGREES NORTH AND 65 SOUTH OF THE EQUATOR

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XUM

Constellations of the Zodiac

Undoubtedly during the period of childhood you amused yourself by swinging around your head a ball at the end of a string. If a fly happened to be on the ball it may have been impressed, if flies ever are impressed, by the speed at which surrounding objects appeared to move, while for it the ball apparently was stationary. Now imagine that you with the string in hand represented the sun, and the ball was the Earth, while the stationary objects outside the orbit of the ball were the various planets. In due time you would perceive that those objects were confined to a path whose width equalled the area covered by the moon as it makes the monthly flight around its primary, the Earth.

Neither you nor I would be aware that the Earth is speeding around the sun were there no stellar background to disclose the fact. Judged by the seeming nearness of the stars, the Earth moves along its orbit at an exceedingly slow pace; actually its motion is at the rate of nearly nineteen miles a second! The stars, instead of being just a little way above our heads, are at such vast distances that they do not reveal Earth's constant changes in position until a considerable period has passed.

The very nearest of the visible stars in the northern hemisphere, known as Sirius, is more than fifty thousand billion miles away, or approximately 8⅔ light years; the others, of course, are at various distances in excess of that incomprehensible mileage. From this you readily perceive why the stellar bodies are so much slower in their apparent retrograde motions than would be the case were they reallly as near as they seem to be.

Although the Earth is rushing around the sun so swiftly we see the same stars rise above the eastern rim of our planet only four minutes earlier each night, or approximately one-half hour every week. Were they actually as close as they seem to be, the speed of their apparent eastward motion would have destroyed the elusive beauty which prompted the shepherds of the long-ago to give rein to their imagination. Lacking the inspiration that comes from "considering the heavens" when no sounds, save the weird voices of night are heard, the shuttles of the soul might never have woven those varied tapestries of dreams whose warp and woof were tinted with ancient myths, and which were spread eventually upon the sky, to become the stellar groupings, now known as constellations, whose imaginary boundaries shall last until the slow-moving fingers of Time tear them apart. And so, because those nature-nourished men had the leisure and the will for dreaming, Cassiopeia, seated in her whirling chair, watches the Bears on the opposite side of the sky. For untold centuries the fiery Dragon has stretched its sinuous folds across the heavens. Touched by fingers no mortal has ever seen, Lyra, the Harp, sends its music from star to star. Orion the faithful guardian of the celestial host, ceaselessly faces the Bull whose lowered head and gleaming eyes would otherwise bring consternation to the peaceful denizens of the stellar realms. Cygnus, the Swan, skims slowly over the Milky Way, the endless Trail that is a glowing emblem of eternity.

Very early in the history of mankind the prominent stars, especially those of the Zodiac, must have served to record the passage of time, for there has never been known a more accurate device for such purpose than the apparent motion of those remote points of light. Even today Earth's inhabitants depend on the stars for recording the seconds and minutes as they slide into the vault of bygone ages.

The earliest tillers of the soil undoubtedly recorded the movements of the twinkling stars throughout the year, the better to determine the proper seasons for sowing and for reaping. And the various stars which, successively, have marked Earth's upper pole, as well as the others which each night are always in view when the sky is clear undoubtedly served to guide the earliest mariners as they sailed the seas.

The rising and the setting of the celestial host were of great importance to those progenitors of ours, and the wonder and the mystery surrounding them eventually led to their transfiguration into objects of worship. And so it is not strange that those shining bodies were endowed at last with power to influence, both adversely and otherwise, the lives of their devotees. The earliest form of religion known came into existence through star-worship. In various sections of the globe there have been found the ruins of temples whose altars were oriented to catch the first rays of certain important stars. In the adoration of the stellar bodies and through the belief that in some subtle way they actually controlled the lives of Earth's inhabitants there finally was born the mooted philosophy, known as astrology. This was later followed by astronomy, the real science of the stars. Without considering the merits, or the demerits, of astrology, it should be stated that its followers, of necessity, recognize the constellations, or "signs." In fact, their so-called occult powers form the important feature of that ancient belief.

The astronomer also uses celestial groupings, but for a different purpose, viz., to describe locations of all celestial bodies. For example: a comet may suddenly make its appearance. Immediately its location is stated by some watchful astronomer as being within some certain constellation, say Scorpio. As Harvard observatory is the world's "clearing-house" for astronomical events, the location of the comet is telegraphed to that observatory, and from there the information goes to practically all observatories.

Many traditions respecting the constellations have emerged from the mists of antiquity, but knowledge available regarding the aspects of astronomical science in bygone ages is somewhat blurred. One of the traditions affirms that the immediate descendants of Adam and Eve cultivated a knowledge of the stars, and that Seth and Enoch inscribed upon two pillars—one of brick, the other of stone—the names, the meanings, the secret virtues (astrology?), and something of the science of the stars; and, in addition, the twelve divisions of the Zodiac. The noted Hebrew historian, Josephus, states that he saw in Syria the pillar of stone, just mentioned.

The sun, the moon, the planets, plus certain stars, are always to be found somewhere along the narrow belt that encircles the heavens, eighteen deg. wide and divided lengthwise in halves, by the great circle known as the ecliptic; this circle is the path followed by the sun in its apparent motion amongst the stars.

We may well believe that the creators of the constellations of the Zodiac found it natural to represent the stars which rose with the sun in Spring by the animals they held in greatest esteem at that season. Accordingly we find Aries, the ram, and Taurus, the bull, as the symbols for March and April, while Gemini, the twins, represented May.

At the summer solstice, June 22nd, the sun is said to enter Cancer, discontinuing his apparent prograss northward, then begins the return to the south. This retrograde motion was fitly represented by a crab as it is said to move backward.

The fierce heat of July and August was supposed to drive the lions from the desert in quest of the water obtainable in the Nile; hence Leo is the symbol of the midsummer month.

At harvest time the sun enters the sixth zodiacal constellation, and so the ancients represented that group, by a maiden with an ear of corn in her hand. This group is known as Virgo, the Virgin.

At the autumnal equinox, when the sun enters Libra, the Balance, the days and nights are everywhere equal, so a pair of scales is a suitable symbol.

In olden times it appears that autumn brought a variety of diseases, so the group entered them by the sun on its yearly journey was represented by a scorpion which, as it recedes, wounds with its stinging tail. In summer this long, slender constellation may be seen crossing the southern section of the sky. Its foremost stars are on a curved line, resembling somewhat an opened parachute. By drawing an imaginary line toward the east from each of those stars, intending them to converge, they will come together at the point where shines a gorgeous red star, Antares.

When you look at Antares you will have no inkling that, instead of being simply a point of light, it is in reality a giant sun, one whose diameter is about five hundred times greater than that of our sun, which, you will recall, is approximately 865,000 miles. It is its great distance from Earth (175 light years) that causes it to appear only as a ruddy point of light. And because of that distance we are unable to see that it has a companion sun whose rays reflect an emerald hue. This pair of suns is, as a unit, headed our way, but by the time they arrive where we now are, a million years or so ahead, our seemingly great sun, plus its satellites, will be somewhere else. There is ample space in the heavens for myriads of giant suns to move without hitting each other. However, there may be times when a collision does take place. It might be well to mention again that our sun and his family are flying north-westerly at the constant rate of 12-2/10 miles a second, relative to the other stars, so they cover about four hundred million miles of celestial space every year! At that speed these celestial bodies need about fifteen thousand years to negotiate the distance designated as one light year. If you multiply fifteen thousand by one hundred seventy-five, the result will inform you how many years would be necessary for Antare to arrive at the spot where we are now.

By October 24th the Earth will be so placed that the sun will appear to be making its entrance into Scorpio; but owing to the solar brilliance the Scorpio stars will be invisible. Not until six months later will Antares shine in all its glory to Earth's inhabitants.

When the astronomer states that the sun moves into a certain constellation, or "Sign," of the Zodiac, he means that it appears to do so. In reality, it is the movement of the Earth around the sun each year that produces the changing panorama. Just remember the ball on one end of the string.

When autumn frosts paint the leaves with brown and gold and red so vividly that they become a shining mark for the mighty hunter, Death, what could be more appropriate than that the stars should then assume the outlines of an archer, with his arrows of destruction? So the creators of the constellations gave to those stars the name "Sagittarius."

Capricornus, the goat, fond of climbing rocky and dizzy heights, is the fitting emblem of the winter-solstice—the time when the sun begins his ascent from the southern tropic.

We who live where the winter season is noted for its abundant rain can appreciate why the stellar group, into which the sun then enters shoud be known as "Aquarius," the water-bearer, carrying a bowl from which the rain is poured. When winter has come to an end and the rivers, abounding with fish, begin to yield their sustenance, the last of the zodiacal groups, Pisces, is symbolized, quite fittingly, with a pair of fish, tied firmly back to back.

The great belt of the Zodiac, as was stated, is divided into halves, the ecliptic being the dividing line. This belt has twelve divisions, each sixteen deg. by thirty deg. Therein move the various planets with their satellites, together with the sun. The groups in evidence during the spring are Aries, Taurus and Gemini; of summer, Cancer, Leo and Virgo; of autumn, Libra, Scorpio and Sagittarius; of winter, Capricornus, Aquarius and Pisces.

UNIQUE HONOR BESTOWED UPON JAMES Q. GANT, JR., M.D. CRATER ON MOON NAMED FOR HIM

Doctor H. Percy Wilkins, Director of The Lunar Section of the British Astronomical Association recently announced that: "The Lunar crater Archimedes-A will henceforth be known as Lunar Crater Gant, in honor of Doctor James Q. Gant, Jr., of Washington, D. C., in recognition for his observations of lunar surface details over many years."

DECEMBER EVENING SKIES

December ushers in those splendid constellations—Orion, Taurus, Gemini and Auriga. What a group of scintillating worlds they are bringing into view! The eye at one glance eastward holds upon its retina seven first magnitude stars—Aldebaran, the fiery red eye of Taurus; Betelguex and Rigel in Orion; Pollux in Gemini; Capella in Auriga; Procyon in Canis Minor, and the most brilliant of all stars, Sirius, in Canis Major. As there are not a great many first magnitude stars in the whole heavens, it can readily be seen how we are favored at this season of the year. Star magnitudes relate to their relative brightness as soon from the earth, and not to their distance. Some of the bright ones are farther from us than many of the faint ones.

Turn aside from the attractions of the fireside any of these evenings and gaze upon the incomparable stellar spectacle. Let your imagination soar with the thought that these same stars were looked upon by the lowly Nazarene, the Caesars, and shepherds two thousand years ago; that thousands of years before them other bearers of hope, other Caesars, and other shepherds gazed with awe and wondering admiration upon this scene, and that millions of years before their time these same stars shone out upon the night.

It is well to commune with nature once in a while, to have some thougth of the great system of which our world is a part, to have a realizing sense of our own littleness, and we shall then be better men and women for it. The Satellites of Jupiter, Saturn and other planets revolve about their primaries, and the planets in turn revolve about the sun. But why should the succession of revolution stop there? Why is it not possible for our own sun and other suns to move about some greater central sun? About the middle of the past century the astronomer Maedler conceived that there was such a central sun, the post of honor being assigned to the star Alcyone in the Pleiades, which was regarded as the center of the universe.

This little group of stars, now so finely in view,

Continued on Page five

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Vol. XLVIII Oct. - Nov. - Dec., 1954 No. 482

AMATEUR'S FORUM

By IRVING L. MEYER, M.S.

OCTOBER 1954

THE SUN: crosses Virgo to the western edge of Libra. It is now moving progressively deeper into the southern heavens. Distance the 1st is 93.0 million miles, and the 31st is 92.2 million miles.

THE MOON: is closest to the earth the 12th at 222,000 miles, and is farthest the 27th at 253,000 miles.

The Moon's Phases E. S. T.):

First quarter	October	5 at 12:31 AM
Full Moon		12 at 12:10 AM
Last quarter		18 at 3:30 PM
New Moon		26 at 12:47 PM

MERCURY: spends the entire month in the Virgo-Libra area, as an evening star until the 29th. On the 5th it reaches greatest elongation east of the Sun, 25° 32′, and for a few days before and after this date will be visible in the western sky, close to the horizon as dusk deepens. On the 5th magnitude is 0.3, diameter is 6½″, and in the telescope will appear gibbous. On the 9th it is in conjunction with Saturn, but is more than 5° south of that planet. It is closest to the earth the 29th at 62 million miles.

VENUS: travels from Libra into Scorpio in the evening sky. It shines after sunset as a brilliant jewel in the west, and achieves greatest brilliancy the 11th at magnitude —4.3. Anyone who knows exactly where to look for this planet, can see it easily in broad daylight. During the month, distance decreases from 45 to 28 million miles, diameter increases from 34″ to 55″, and the amount of the disc illuminated as seen from earth decreases from 33% to 8%. As seen with the telescope (and moderate power) Venus appears as a progressively thinner crescent each day.

MARS: is in the evening sky, going from Sagittarius into Capricornus. Distance from the earth is increasing rapidly (from 74 million miles and an apparent diameter of 12″ on the 1st, to 91 million miles and 9½″ the 31st) causing this ruddy planet to lose much of its lustre, though it is still very bright, and exceeded by only a few stellar objects. Pretty high power is required to reveal much on the disc of this planet. It sets around midnight.

JUPITER: in the morning sky, moves slowly on the Gemini-Cancer boundary. It rises at around midnight, and is well placed for observation in the late morning sky. On the 15th, distance is 486 million miles, diameter is 38″, and magnitude is —1.8. Opera glasses are sufficient to reveal the four larger satellites.

SATURN: is in the evening sky on the Virgo-Libra boundary, but too close to the Sun for satisfactory observation. Distance the 15th is 1003 million miles.

URANUS: patrols the northern heavens, very close to Jupiter and in the Cancer-Gemini area. On the 7th Jupiter and Uranus are in conjunction, with Uranus about ⅔ the Moon's apparent diameter north of Jupiter. Uranus is barely visible to the naked eye, but it can be seen without optical aid on a clear, moonless night. Its magnitude is 6. In the telescope, its 4″-diameter disc is readily perceived with a power of 50 diameters. Distance the 15th is 1741 million miles.

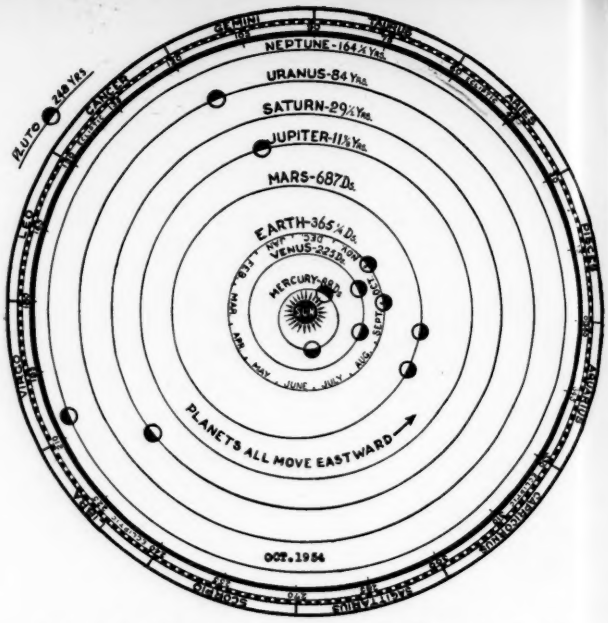
NEPTUNE: in Virgo, is too close to the Sun for observation. It is in conjunction with the Sun on the 19th, thereupon becoming a morning star. Maximum geocentric distance, the 19th, is 2909 million miles.

PLANETARY CONFIGURATIONS

Eastern Standard Time

OCTOBER 1954

Oct.	4— 6:	AM	Mars in perihelion
	4— 4:	PM	Venus greatest heliocentric latitude south
	5— 6:47	PM	Conjunction, Mars and Moon; Mars south 3° 59′
	5—11:	PM	Mercury greatest elongation east, 25° 32′
	7—11:	PM	Conjunction, Jupiter and Uranus; Jupiter south 0° 21′
	9— 6:	AM	Conjunction, Mercury and Saturn; Mercury south 5° 34′



Orbits and Heliocentric Movements of the Planets for October

NOTE: The planets are shown in their respective orbits. Two positions, one for the first, and one for the last day of the month, are given for Mercury, Venus and Mars. The arrow indicates the last day of the month, Jupiter, Saturn, Uranus and Neptune are shown in the mean position for the current month.

11—	3:	AM	Venus greatest brilliancy
12—	4:	PM	Mercury greatest heliocentric latitude south
18—	7:	AM	Mercury stationary in Right Ascension
18—	9:07	PM	Conjunction, Uranus and Moon; Uranus north 2° 13′
18—	10:53	PM	Conjunction, Jupiter and Moon; Jupiter north 1° 58′
19—	1:	PM	Conjunction, Neptune and Sun
21—	9:	AM	Quadrature, Uranus and Sun
22—	4:	PM	Quadrature, Jupiter and Sun
24—	6:	AM	Conjunction, Mercury and Saturn; Mercury south 4° 41′
25—	2:	PM	Venus stationary in Right Ascension
26—	4:12	AM	Conjunction, Neptune and Moon; Neptune north 6° 50′
27—	3:28	AM	Conjunction, Mercury and Moon; Mercury north 2° 53′
27—	9:40	AM	Conjunction, Saturn and Moon; Saturn north 6° 35′
28—	10:	AM	Quadrature Mars and Sun
28—	6:15	PM	Conjunction, Venus and Moon; Venus south 3° 9′
29—	4:	PM	Inferior conjunction, Mercury and Sun; Mercury south 0° 41′
31—	4:	PM	Mercury in ascending node

AMATEUR'S FORUM

By IRVING L. MEYER, M.S.

NOVEMBER 1954

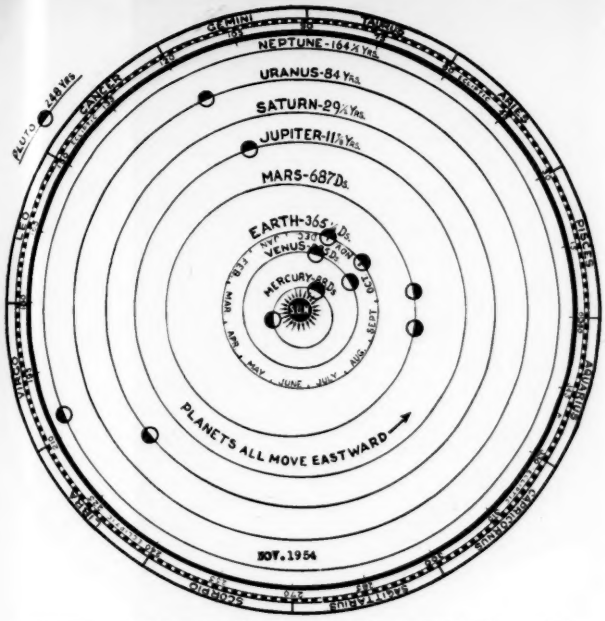
THE SUN: crosses Libra into Scorpio. It is now deep in the southern skies. Distance from the earth is 92.2 million miles the 1st, and 91.6 million miles the 30th.

THE MOON: is at perigee (closest to the earth) the 10th at a distance of 222,000 miles, and is at apogee (farthest) the 23rd at 253,000 miles.

The Moon's Phases (E. S. T.):

First quarter	November	3 at 3:55 PM
Full Moon		10 at 9:29 AM
Last quarter		17 at 4:32 AM
New Moon		25 at 7:30 AM

MERCURY: spends the month in Libra. It is a morning star all month, but is observable only for a few days around the time of greatest western elongation from the Sun, 19° 19′, on the 14th. It will then be observable in the morning twilight, close to the eastern horizon. Magnitude will be about —0.3 at this time, and its slightly gibbous disc will look like a miniature 8-day Moon, as seen in the telescope. Its diameter is 7″. Distance



Orbits and Heliocentric Movements of the Planets for November

increases from 64 to 121 million miles during the month.

VENUS: is in inferior conjunction with the Sun on the 15th, and thereafter appears in the morning sky. Retrograding from Scorpio into Libra, it is a difficult naked eye object, but can be seen the entire month in a circle-equipped telescope, as it passes no closer than 3° of the Sun. It will be an extremely thin crescent the entire month. Closest approach to the earth, the 15th, results in a geocentric distance of 24.8 million miles, and an apparent diameter of 63″.

MARS: in Capricornus in the evening sky, is still readily observable. It sets around midnight. On the 1st, distance is 92 million miles, diameter is 9½″, magnitude is 0.1, and 85% of the planet's disc is illuminated, as seen from the earth. On the 30th, distance is 103 million miles, diameter 8″, magnitude 0.5, and illumination 86%. In the telescope it will be distinctly gibbous.

JUPITER: in Cancer, is a brilliant morning star, rising shortly before midnight. On the 15th, it is 443 million miles away, with magnitude —2.0 (surpassed only by Venus), equatorial diameter 41″, and polar diameter 38½″. Moderate power on the telescope will reveal this distinct polar flattening, as well as the cloud bands across the disc. The four brighter satellites are easily seen; in fact, higher telescopic powers will reveal their small, round discs.

SATURN: in Libra, is in conjunction with the Sun the 4th, entering the morning sky. Too close to the Sun all month to be observable. Maximum distance is reached the 4th at 1008 million miles.

URANUS: is well placed for observation in Cancer, high in the northern skies. It rises with Jupiter, before midnight. Though it is a 6th magnitude object, it can be seen with the unaided eye. On the 15th, distance is 1693 million miles.

NEPTUNE: in Virgo, in the morning sky, is too close to the Sun to be observable. Not visible to the naked eye. Distance the 15th is 2899 million miles.

PLANETARY CONFIGURATIONS

Eastern Standard Time

NOVEMBER 1954

Nov.	3— 9:	AM	Uranus stationary in Right Ascension
	3— 2:28	PM	Conjunction, Mars and Moon; Mars south 5° 3′
	4— 8:	PM	Conjunction, Saturn and Sun
	5— 7:	AM	Mercury in perihelion
	7— 8:	AM	Mercury stationary in Right Ascension
	14— 7:	PM	Mercury greatest elongation west, 19° 19′
	15— 2:	AM	Inferior conjunction, Venus and Sun; Venus south 3° 43′
	15— 4:46	AM	Conjunction, Uranus and Moon; Uranus north 2° 29′
	15— 8:50	AM	Conjunction, Jupiter and Moon; Jupiter north 2° 25′
	15— 2:	PM	Mercury greatest heliocentric latitude north
	17— 3:	AM	Jupiter stationary in Right Ascension
	22—12:10	PM	Conjunction, Neptune and Moon; Neptune north 6° 52′
	23— 8:	PM	Conjunction, Mercury and Saturn; Mercury south 0° 25′
	23—10:06	PM	Conjunction, Saturn and Moon; Saturn north 6° 23′
	23—10:23	PM	Conjunction, Mercury and Moon; Mercury north 5° 57′
	24— 1:56	AM	Conjunction, Venus and Moon; Venus north 2° 30′
	25—12:	AM	Conjunction, Mercury and Venus; Mercury north 2° 58′
	28— 7:	PM	Conjunction, Venus and Saturn; Venus south 2° 32′
	29—11:	PM	Venus in ascending node

DECEMBER EVENING SKIES

Continued from page three

has strongly appealed to writers of all ages, and the mysticism concerning the seven stars goes back even as far as the book of the prophet Job. "The sweet influence of Pleiades" seems to have appealed to all nations and tribes, and there is an almost universal legend of the "lost sister." Such a widespread belief must find its true explanation in fact; but which in truth is the lost Pleiad is hard to know. The six stars readily visible are: Alcyone, the brightest of the third magnitude; Electra and Atlas, slightly brighter than the fourth magnitude, with Merope and Taygeta slightly fainter. In addition to these six, Celaned, which gives but one-third the light of Taygeta, can be readily seen, as can also Pleione. These eight stars are easily visible to anyone.

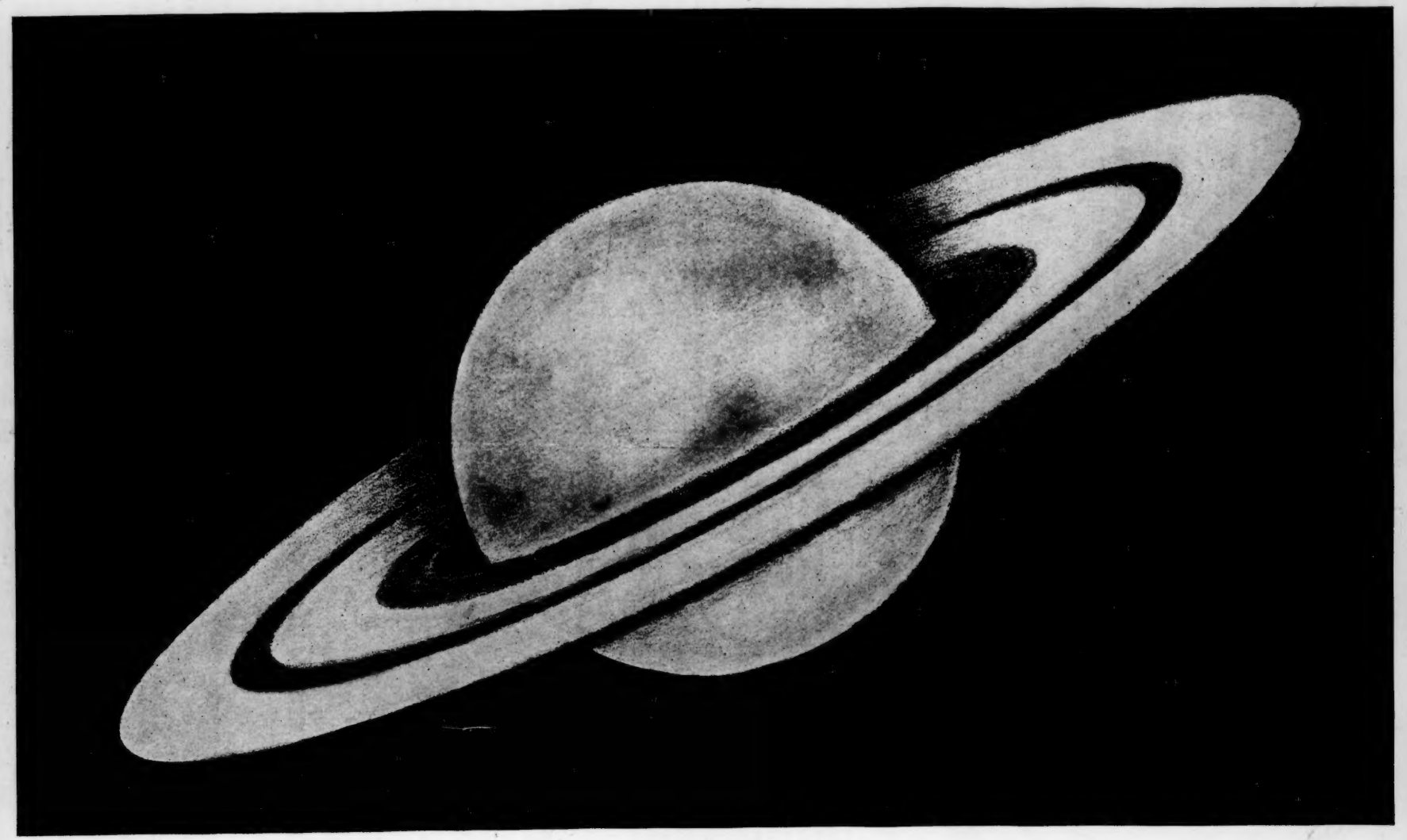
Moderately keen eyes may count nine Pleiades, while exceptionally keen vision reveals eleven or even fourteen. With a two-inch telescope nearly one hundred can be counted in the group, while modern photographs reveal over two thousand.

The peculiar character of the spectrum of Pleione led Prof. Pickering to the belief that it formerly shone with a temporary brilliancy, and that it is the lost Pleiad. As a matter of fact, this star is now twice as bright as it was, by Argelander's estimate, seventy-nine years ago.

Observations since Maedler's time have not confirmed his hypothesis, and there is not sufficient scientific basis for the notion that Alcyone is the center of the universe. None the less, it will be interesting to compare our own sun with the distant sun, and to estimate its brightness if it were at the distance of the Pleiades. It is generally conceded that this group is very remote, so far off, in fact, that it takes light traveling at the almost inconceivable speed of 186,000 miles per second as much as 190 years to cross the distance from the Pleiades to us. Light with its great velocity takes but eight minutes of time to cross the intervening ninety-three million of miles between us and the sun. If the sun were twice as far from us as it is now, we would receive but one-quarter of the light we now get. With each increase of distance, its brilliancy would decrease as the square. At the enormous distance of Alcyone, the light of our sun would be so feeble that it could not be seen with the naked eye, for it would be but of 8.6 magnitude. There is little doubt that at least fifty of the Pleiades surpass in magnitude and brilliancy our own glorious sun, and Alcyone is at least 170 times as brilliant! The stars are suns, and our sun is a star, but it is a rather small and insignificant star in the great universe. Verily, "one star differeth from another in glory!"

THE PUBLISHER OF THE MONTHLY EVENING SKY MAP will appreciate the kindly interest of its subscribers in sending the names of those whom they think to be interested in the study of the "STARS," we will take great pleasure in sending them sample copies.

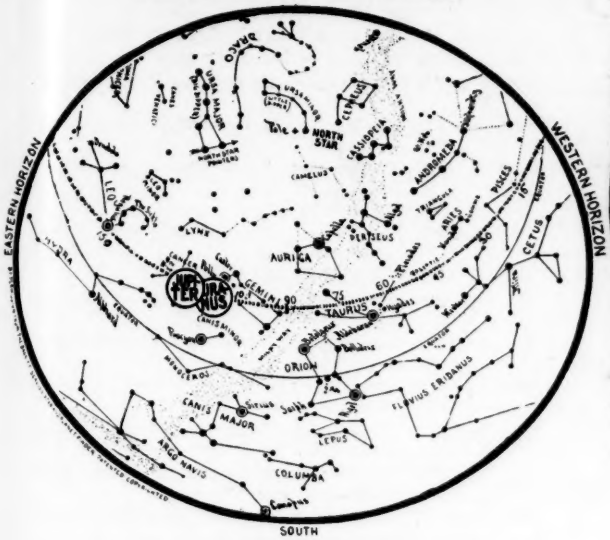
XUM



SATURN
From a Pencil Drawing
By
HAROLD A. CHRISTIANSEN

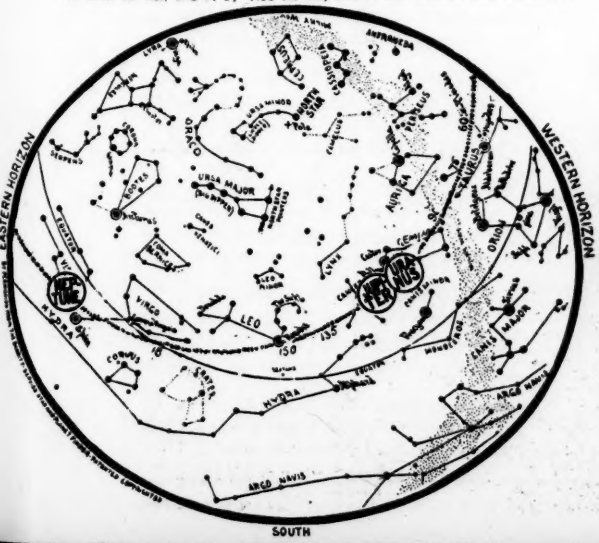
The Monthly Evening Sky Map

MORNING SKIES FOR OCT.-NOV.-DEC.

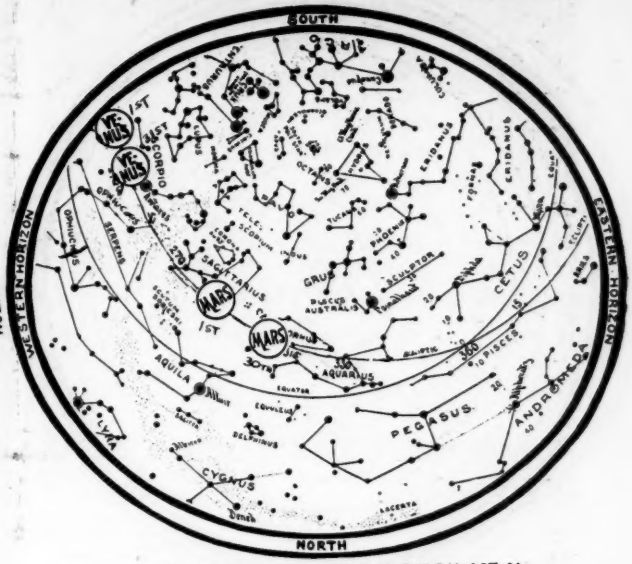


AT 5:00 A.M., OCT. 1; 4:00 A.M., OCT. 15; 3:00 A.M., OCT. 31

At 5:30 A. M., NOV. 1; 4:30 A. M., NOV. 15; 3:30 A. M., NOV. 30

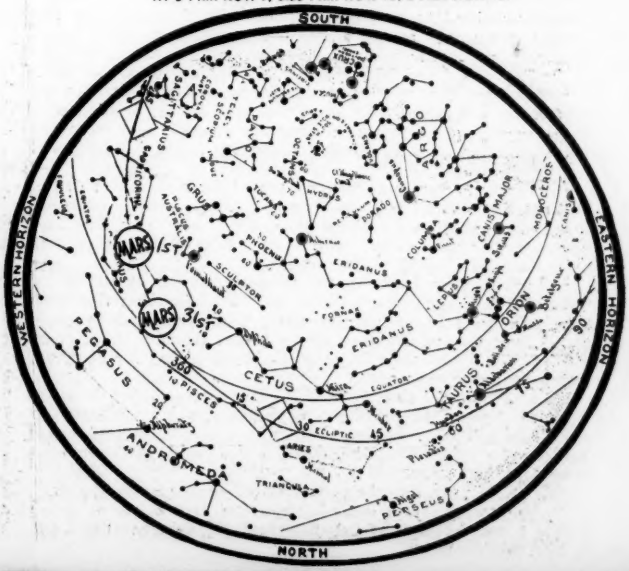


Evening Sky Southern Hemispheres



AT 9:00 P.M. OCT. 1; 8:00 P.M. OCT. 19; 7:00 P.M. OCT. 31.

AT 9 P.M. NOV. 1; 8:30 P.M. NOV. 10; 8 P.M. NOV. 15.



HAROLD A. CHRISTIANSEN

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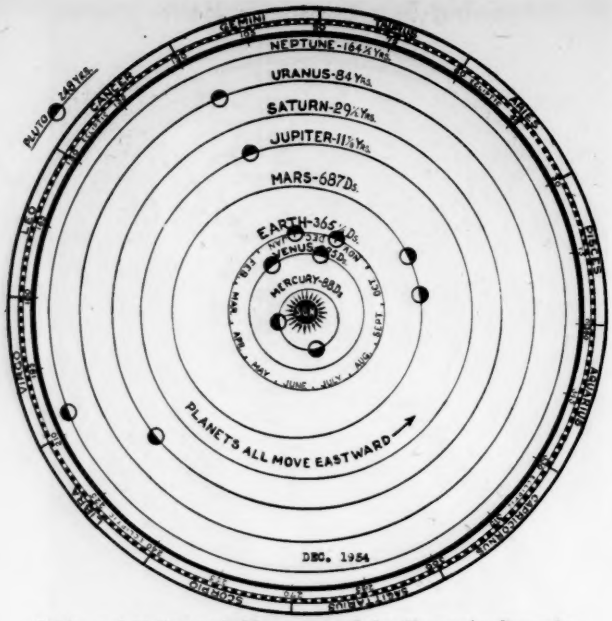


Orbits and Heliocentric Movements of the Planets for December

AMATEUR'S FORUM

By IRVING L. MEYER, M.S.

DECEMBER 1954

THE SUN: makes its greatest penetration into the southern heavens this month as it moves from Scorpio into Sagittarius. Distance decreases from 91.6 million miles the 1st to 91.4 million miles the 31st.

There will be an annular eclipse of the Sun on the 25th. This eclipse will not be visible in the United States, but will be visible over areas of southern Africa, the East Indies, Australia, Antarctica, and stretches of the South Atlantic, Indian, and Pacific Oceans. The only major land mass traversed by the annular phase is the southern tip of Africa.

THE MOON: is at perigee (closest the earth) the 8th at 223,000 miles, and is farthest from the earth (apogee) the 21st at 252,000 miles.

The Moon's Phases (E. S. T.):

First quarter	December 3 at 4:56 AM
Full Moon	9 at 7:56 PM
Last quarter	16 at 9:21 PM
New Moon	25 at 2:33 AM

MERCURY: is too close to the Sun the entire month to be observable. It is in conjunction with the Sun the 25th, thereupon entering the evening sky. It travels from Libra, through Scorpio, into Sagittarius, and is farthest from the earth the 22nd at 131 million miles.

VENUS: in Libra, in the morning sky, becomes well placed for observation. At greatest brilliancy the 21st, its crescent-shaped disc shines at magnitude —4.4, surpassing every other stellar object in the heavens. Distance and diameter: the 1st, 28 million miles and 56"; the 31st, 45 million miles, and 35".

MARS: has lost most of its brilliance, and shines about as brightly as a standard first magnitude star. In the evening sky, it moves through Aquarius toward the equator, and sets well before midnight. Distance increases from 111 to 132 million miles during the month.

JUPITER: is becoming better situated for observation daily. In Cancer, it rises a few hours after sunset. It is brilliant (average magnitude —2.1), and with its great size, makes a striking appearance in the telescope with even moderate magnification. Distance the 15th is 409 million miles.

SATURN: is in Libra in the morning sky all month. It is close to Venus the entire month, and at conjunction the 15th they will shine like a pair of gems, being separated by only about the apparent diameter of the Moon. Distance the 15th is 989 miles. This planet will be much better placed for observation in the coming months.

URANUS: on the Cancer-Gemini boundary, continues to move close to Jupiter. Magnitude is 6, putting it at the limit of naked eye visibility. In the telescope, a power of 50 diameters will reveal a tiny, round disc. Distance the middle of the month is 1656 million miles.

NEPTUNE: can now be picked up in the late morning sky, in Virgo. It rises shortly before Venus and Saturn, but at magnitude 8 can be seen only with optical aid. Distance the 15th is 2868 million miles.

PLANETARY CONFIGURATIONS

Eastern Standard Time

DECEMBER 1954

Dec.	2—11:20 AM	Conjunction, Mars and Moon; Mars south 5° 59′
	4— 5:00 AM	Venus stationary in Right Ascension
	9—12: AM	Mercury in descending node
	12— 1:37 PM	Conjunction, Uranus and Moon; Uranus north 2° 34′
	12— 4:44 PM	Conjunction Jupiter and Moon; Jupiter north 2° 31′
	15— 7: PM	Conjunction, Venus and Saturn; Venus north 0° 39′
	19— 7: AM	Mercury in aphelion
	19— 8:14 PM	Conjunction, Neptune and Moon; Neptune north 6° 57′
	21— 4: AM	Venus at greatest brilliancy
	21—10:30 AM	Conjunction, Saturn and Moon; Saturn north 6° 16′
	21— 2:46 PM	Conjunction, Venus and Moon; Venus north 7° 20′
	22— 4:25 AM	Sun enters Capricornus; Solstice
	25—	Annular eclipse of the Sun
	25— 2:22 AM	Conjunction, Mercury and Moon; Mercury south 1° 20′
	25— 7: AM	Superior conjunction Mercury and Sun; Mercury south 1° 36′
	31— 6:40 AM	Conjunction Mars and Moon; Mars south 6° 16′

THE DRAMA OF THE WINTER STARS

O splendor of the crystal Winter night
When bold Orion stars the blazing sky.
Belted and armed and poised for valiant fight,
He faces Taurus of the fiery eye.

Close on his track the brave Dog Sirius leaps,
The Unicorn vaults o'er the Milky Way,
And Procyon his faithful vigil keeps
Upon the fight that rages till the day.

The gentle Gemini with arms entwined
Smile softly at the sister Pleiades,
Whose "influences sweet," that none may bind,
Are infinite as the eternities.

Northward young Perseus flushed with victory
Comes with the trophy of Medusa's head;
But rests not till his royal sword sets free
Andromeda, chained to her rocky bed.

Northwestern King Lear rising in his wrath,
Bears up the sickle with its golden light,
To cleave a way on the Ecliptic path
To the fair Virgin of the Summer night.

Pacing forever on his Polar round
The Great Bear watches the celestial play,
Unconscious that his plodding feet are bound
By an attraction that he must obey.

So we, firm planted on our rolling star,
Heed not the subtle change of time and place,
Unmindful, while we gaze on worlds afar,
That we with them are wanderers in space.

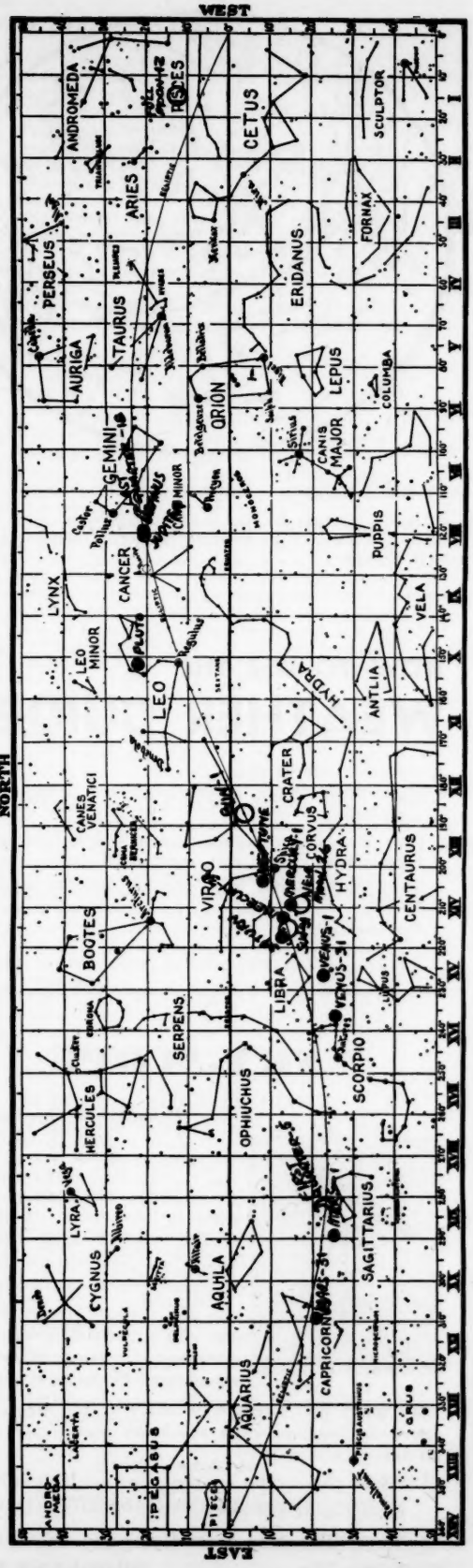
But this we know; that tho' the heavens fall,
By power Omnipotent our way is spanned;
That the Creative Love doth hold us all
Secure within the hollow of his hand.

—Annie L. Muzzey.

XUM

A MERCATOR PROJECTION OF THE STAR FIELD FOR 50 DEGREES NORTH AND 65 SOUTH OF THE EQUATOR

The Star Field makes an apparent complete revolution westward every 24 hours, hence the hourly division from I to XXIV, but this has no relation to the time that any portion of the map is in view. Practical as a Star, Constellation and Planet Finder for the current month—October—Anywhere in the world.
Showing also the position of the Sun at the beginning and ending of the month and the position of the Moon at its several phases.



THE SOLAR SYSTEM

Planet	Diameter (miles)	Distance from Sun (miles)	Time of Revolution
Mercury	3,100	36,000,000	88 days
Venus	7,700	67,200,000	225 days
Earth	7,913	93,000,000	365 days
Mars	4,200	141,500,000	686 days
Jupiter	88,700	483,300,000	11.86 years
Saturn	75,100	886,100,000	29.46 years
Uranus	30,900	1,783,000,000	84.01 years
Neptune	33,000	2,793,000,000	164.79 years
Pluto	6,000(?)	3,666,000,000	248.43 years

The equatorial diameters are given for Jupiter and Saturn.

THE TWENTY BRIGHTEST STARS

Star	Mag.	Luminosity	Distance
Sirius	−1.6	23	8.7
Canopus	−0.9	5,200	180
Alpha Centauri	+0.3	1	4.29
Vega	0.1	48	26.5
Capella	0.2	120	45
Arcturus	0.2	76	36
Rigel	0.3	23,000	650
Procyon	0.5	5.8	11.3
Achernar	0.6	800	140
Beta Centauri	0.9	1,300	200
Altair	0.9	8.3	16.5
Betelgeuse	(0.9)	13,000	650
Alpha Crucis	1.4	900	220
Aldebaran	1.1	120	68
Pollux	1.2	30	35
Spica	1.2	600	160
Antares	1.2	700	170
Fomalhaut	1.3	11	23
Deneb	1.3	6,000	540
Regulus	1.3	140	84

Under "Mag." is given the apparent magnitude (of the primary in cases of multiple stars). The column under "luminosity," gives the true brightness in terms of the Sun. Thus Sirius shines with a brilliance equivalent to 23 of our Suns. Distances are in light-years. The brightness of Betelgeuse varies.

ELGER'S MAP OF THE MOON

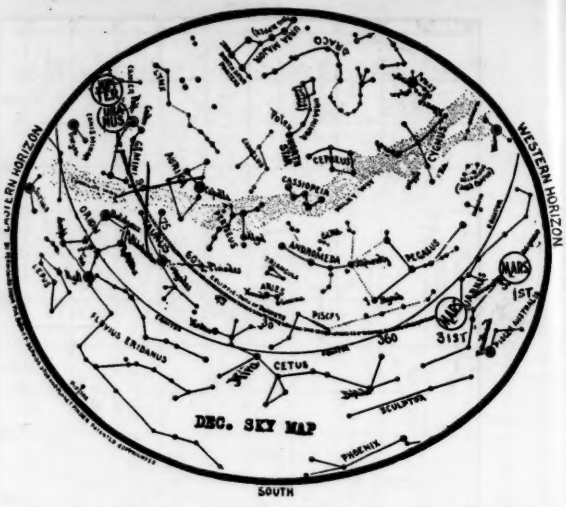
Copies of the most complete map of the Moon has finally arrived from the publishers. This map shows Mountains, Craters, Seas, etc. We have been very fortunate in receiving these maps which are in such great demand. Due to the War these maps were unobtainable, now we have a limited quantity for immediate shipment to our subscribers. This map is printed on very good paper, actual size of the map is 18x18. If you are interested in one of the most fascinating subjects ("The Moon") surely you are not going to miss this opportunity of obtaining one of these maps.

PRICE $2.00 POSTPAID

Evening Sky Map for November, 1954

AT 9:00 P.M., NOV. 1; 8:00 P.M., NOV. 15; 7:00 P.M., NOV. 31

Evening Sky Map for December, 1954



AT 9:00 P.M., DEC. 1; 8:00 P.M., DEC. 15; 7:00 P.M., DEC. 30

This map is arranged specifically for Latitude 40 North—New York—but is practical for ten or fifteen degrees north or South of this latitude anywhere in the United States, the southern portion of Canada and the northern portion of Mexico and for corresponding latitude in Europe.

WEATHER GUIDE

HOW TO USE THE
WEATHER GUIDE

1. Observe the entire sky.
2. Select cloud picture and description best matching your observation.
3. Find direction from which wind is blowing (use compass to locate north).
4. Turn arrow to this wind direction opposite selected cloud picture.
5. Read forecast.

SKY-SCOPE

Complete as illustrated
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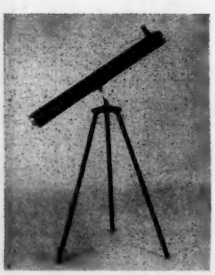

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It has a tested ¼-wave aluminized mirror, 60 power Ramsden type eyepiece and is equatorially mounted on an all-metal stand.

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A fixed eyepiece mounting Springfield Type. 12" Cassegrain telescope balanced at the Declination axis in 3" ball bearings.
Polar axis also in ball bearings and poised by a "pendulum" counterweight.
16" aluminum disk circles graduated to single minutes for R.A. and S.T. and 15' of arc for Dec. Double focussing—both by secondary mirror and at eyepiece.
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Sideral Clock attached near the observer's chair (below the fixed eyepiece).
Total shipping weight 600 lbs.

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The HAINES ELECTRIC SIDERAL CLOCKS are made to accommodate those frequencies and by means of special gearing to convert from Standard Time to Sideral Time, that is to say, from keeping the time of the Sun to keeping the time of the stars.

Astronomers have two sources of data from which to compute Local Sideral Time, The American Ephemeris, published at Washington ($3.75) Superintendent of Documents and The Observer's Handbook, a small volume published by the Royal Astronomical Society of Canada, 3 Willcocks St., Toronto, 60 cents. Greenwich Sideral Time in the Ephemeris pages 2 to 16 and in the Handbook on page 7.

Local Sideral Time which is required in the observatory can be computed from two formulas published in advertising in The Monthly Evening Sky Map and the Observer's Handbook or will be sent to any address upon request and with an example worked out for that location free of charge. Information in the method of using Sideral Time will also be sent free.

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A MESSAGE FROM THE EDITOR

Dear Friends and Subscribers:

Christmas is a delightful respite in the rush of years, when we spend a joyful day in reviewing old comradeships and enjoying new friendships.

At Christmas we stand on the threshold of a new year. Yesterdays are gone forever, todays are filled with opportunities, tomorrows offer high hopes.

The friendship and confidence you have given to me is appreciated, indeed. So in the friendly warmth of Christmas time I extend my wishes for good cheer of the holiday season, and for happiness and prosperity throughout the years ahead.

MRS. LEON BARRITT.

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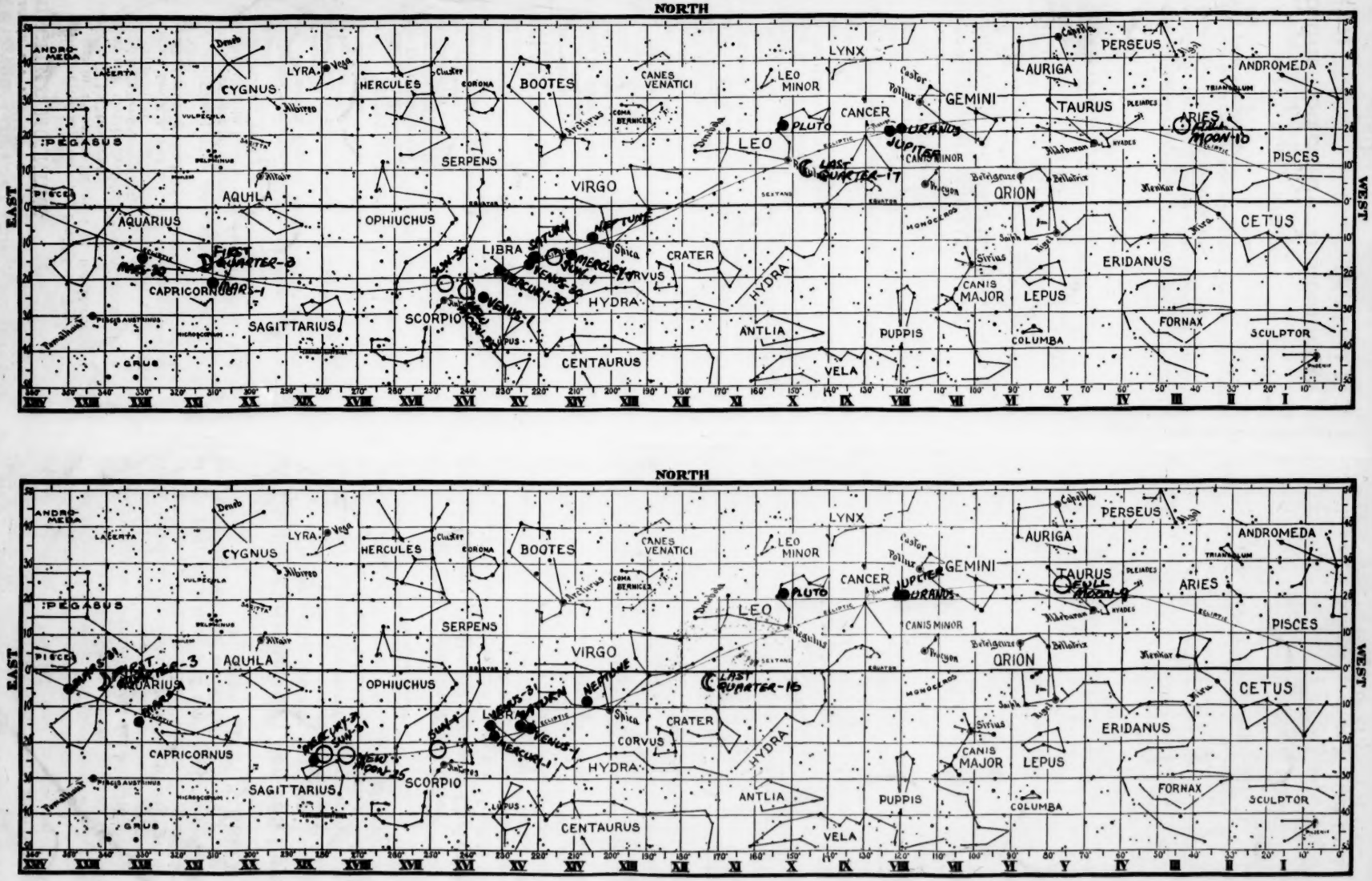
Showing also the position of the Sun at the beginning and ending of the month and the position of the Moon at its several phases.



Nov. 5 Oct. 22 Oct. 5 Sept. 20 Sept. 5 Aug. 20 Aug. 5 July 20 July 5 June 20 June 5 May 20 May 5 Apr. 20 Apr. 5 Mar. 20 Mar. 5 Feb. 18 Feb. 2 Jan. 20 Jan. 5 Dec. 20 Dec. 5 Nov. 20

THE DATE BELOW EACH NUMERAL WILL SHOW WHEN THAT SECTION OF THE MAP WILL BE ON THE MERIDIAN—DUE SOUTH—AT 9 P.M. OR AN HOUR EARLIER FOR EACH NUMERAL WEST OF THIS DATE AND AN HOUR LATER FOR EACH NUMERAL EAST.

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